With support from

Federal Ministry of Food and Agriculture

by decision of the German Bundestag

APD
German-Ukrainian Agricultural Policy Dialogue

within the National Association of Agricultural Advisory Services of Ukraine ДОРАДА

Agro Policy Report

Ukraine's agricultural land sales market during the Russian war against Ukraine

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Kyiv, October 2023

About the Project "German-Ukrainian Agricultural Policy Dialogue" (APD)

The project "German-Ukrainian Agricultural Policy Dialogue (APD)" was implemented in 2006 with the support of the Federal Ministry of Food and Agriculture (BMEL). The beneficiary of the project is the Ministry of Agrarian Policy and Food of Ukraine, the current project phase will be operating until 2021. While the executor of BMEL's entire bilateral cooperation-program is *GFA Consulting Group LLC*, the APD-project in Ukraine is implemented by a consortium consisting of *IAK Agrar Consulting, Leibniz Institute for Agricultural Development in Transition Economies (IAMO),* and *AFC Consultants International.*

The project aims at supporting Ukraine in the areas of sustainable agriculture, efficient processing industry and international competitiveness in accordance with the principles of market and regulatory policies, taking into account the development potential resulting from the Association Agreement between the EU and Ukraine.

To meet this goal, the Project provides information on German, in particular Eastern German, experience and know-how, as well as on international European experience with regard to the development of an agrarian and forestry policy framework including the necessary set-up of agrarian and forestry institutions.

The APD consists of three thematic pillars, one of them – the land component – is managed by BVVG German AgriForest Privatization Agency, a state-owned enterprise that is responsible for the administration of state-owned agricultural and forestry land in (Eastern) Germany. Under the land component, the project offers an exchange of experience and know-how between Ukrainian and German land management experts from BVVG and additional German land management institutions. The land component focusses on political, legal and technical issues related to land management and accompanies the current discussions in Ukraine concerning land market development.

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Territorial community	TC
Cabinet of Ministers of Ukraine	CMU
Classification of the Types of Land Purposes	CTLP
Consumer price index	CPI
Difference-in-differences	DiD
Hectare	ha
Herfindahl-Hirschman Index	HHI
State Classification of Administrative-Territorial Subjects of Ukraine	KOATUU
Normative Monetary Valuation	NMV
Land for individual farming	OSG
Ministry of Justice	MoJ
State Registry of Property Rights on Real Estate	SRPRRE
State Service for Geodesy, Cartography, and Cadaster	SGC
Ukrainian hryvnia	UAH

1. Introduction

The Ukrainian land sales market continues operating under extreme conditions of the Russian war against Ukraine that has been waged since the beginning of 2022. The initial shock shortly after the beginning of the Russian military aggression has somewhat subsided and we observe a certain degree of stabilization on the sales market (Kvartiuk & Martyn, 2022). However, the war may have unexpected effects on the sales dynamics and requires systematic monitoring to avoid unwanted events like distress sales or excessive land concentration. To achieve that, analysts require a sound monitoring system that relies on data about land transactions and ownership. We address these challenges by first analyzing the availability and quality of data generated by the land monitoring system. Then, we examine the recent trends on the sales market explicitly considering the effects of the war. In particular, we use previous related APD studies (Kvartiuk & Martyn, 2021, 2022) as reference studies and build on them ensuring comparability of the results.

We also address the discussion about the upcoming liberalization of the land sales market on January 1, 2024. In particular, legal entities are expected to be granted access to the commercial agriculture land sales market and ownership caps to be expanded up to 10,000 ha for all market participants. Some observers suggest that current war conditions may lead to misuse and excessive land accumulation suggesting postponing this step of land market liberalization. This study addresses these concerns and examines the behavior of private entities trying to predict their behavior in the next year. In particular, we analyze how firms act on the sales market of the land for individual farming (OSG) in comparison to individuals and other market players.

To accomplish these tasks, we use the data of the system for monitoring land relations from the State Service for Geodesy, Cartography, and Cadaster (SGC). These are plot-level and entity-level data providing insights into land sales transactions. The study is organized in the following fashion. We first provide an overview of the available data discussing its quality and implications for the analysis. Second, we analyze land sales prices and possible effects of active fighting including distress sales. Then, we present an overview of land turnover. And, finally, we examine the dynamics of land concentration.

2. Institutional context in 2023

Despite the ongoing Russian war against Ukraine, Ukrainian land reforms have continued with a long-term vision of liberal land relations. First, we see the government's efforts to ensure liquidity

and transparency of the land market. For instance, Law 2698-IX from 19.10.2022 ensured that state-owned and communal land plots under permanent land use can be purchased by land users at the rate of Nominal Monetary Valuation (NMV). Another example is that Law 3065-IX from 02.05.2023 simplified transactions with the small OSG-land plots and plots for gardening eliminating expensive notary checks for buyers. Finally, it is important to point out that the Ministry of Justice (MoJ) granted access to the State Registry of Property Rights on Real Estate (SRPRRE) for some frontline territorial communities (TCs). This is connected to the relative stabilization of the military situation in the regions with active fighting with the military formations of the Russian regime. The Order 199 from 13.07.2023 by the Ministry of Reintegration of the Temporarily Occupied Territories defined the TCs where active fighting is taking place excluding them from the access to SRPRRE. The TCs not listed here have full access to the SRPRRE. Because transactions were not possible in these TCs since the beginning of the war, we could observe a short-term increase in the number of transactions here.

Country-wide taxation of agricultural land starting in 2023 may have affected sales and rental prices. In particular, the State Taxation Service of Ukraine has clarified the calculation of the so-called 'minimal tax obligation' for a ha of agricultural land. This tax is designed to level the playing field for the taxation between the formal and informal land rental. In the previous years, up to a third of agricultural producers (especially small ones) often cultivated land without registered rental contracts relying on verbal agreements and cash transactions to reduce their tax obligations. However, administering the tax has proven challenging and requires further improvements. Naturally, this tax should have negatively affected land prices. However, it is important to point out that the TCs where active fighting took place were freed from this tax.

An important debate is currently taking place about further liberalization of the land sales market. According to the Law on Land Circulation from 31.03.2020, legal entities will get access to the agricultural land market starting in 2024. Moreover, ownership caps will be raised to 10,000 ha for all market players. The essence of the debate is about whether this liberalization step should be postponed due to the ongoing war. The proponents of the postponement have concerns about the misuse by large market players within the imperfect institutions affected by the war. For instance, some observers are concerned about the effectiveness of the screening mechanism to ensure that enterprise-buyers are free of foreign capital (foreigners are officially banned from participation in the Ukrainian agricultural land sales market). Moreover, limited access to the

public cadastral map due to the war is often used as an argument in favor of postponement[1]. However, assuming that these concerns do not materialize, further market liberalization is expected to bring about large economic benefits to the agricultural sector and landowners in particular. In particular, increased demand for land should stimulate land price growth and attract investments. In addition, allowing transparent land sales for all market players should hinder the shadow land market that has existed despite the existing restrictions. We will address this discussion by comparing the behavior of legal entities and individuals on the land sales market.

3. Dynamics of land sales and prices

3.1 Transactions data description

Before proceeding with the analysis, we examine the data from the SRPREE. By July 1, 2023, we found 609,599 transactions with agricultural land. **Помилка! Джерело посилання не знайдено.** presents the distribution of transactions by type during the three periods of interest: before the Russian war, after the invasion in 2022, and after the invasion in 2023. We see that a vast majority of all the transactions represent inheritances. The share of land sales went from nearly one-third of all transactions to ca. one-fifth in 2022 after the Russian invasion. In 2023 it recovered somewhat and land sales accounted for 23.31% of all transactions with agricultural land. Somewhat alarming is the increase in the gift contracts which may suggest a rise in the number of shadow deals. The number of land exchanges went down dramatically after the Russian invasion and stayed the same thereafter. The number of somewhat exotic and legally questionable transactions "Lifetime support in exchange for land" went up after the invasion in 2022 (to 45 from 35 contracts before the invasion) but were nearly non-existent in 2023 (only 3 contracts).

[1] Despite the temporary lack of public access to the cadastral map during the wartime period, the State Geocadastre continues to provide electronic cadastral services for individual land plots, including the provision of information certificates and extracts from the State Land Cadastre (without indicating the geodetic coordinates of land borders for security reasons). There are also non-state geoportals that publish land cadastral data (for example, https://kadastr.live).

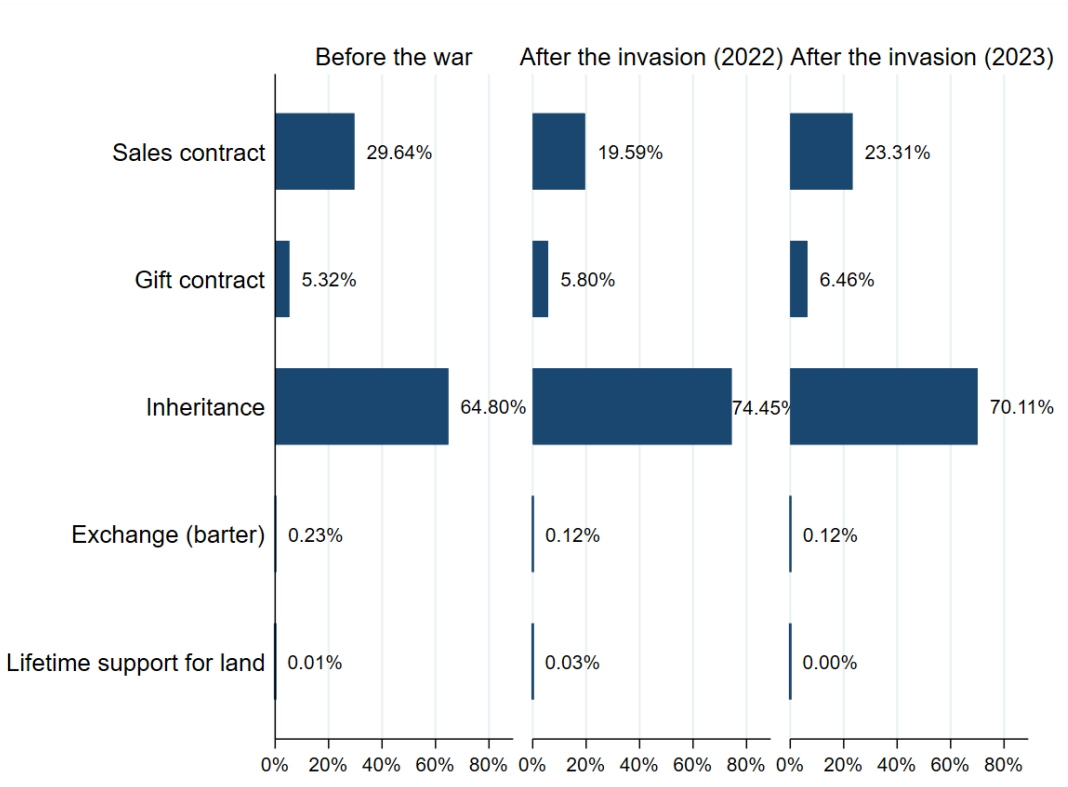

Figure 1. Land transactions by type and time period.

Figure 3 demonstrates the temporal distribution of the number of sales contracts for the land for commercial agriculture, OSG-land, and other types. We see an increase in the total number of contracts in comparison to 2022. For the land for commercial agriculture, the increase went up from ca. 2,800 contracts per month in 2022 to ca. 3,600 contracts per month in 2023. This is still below the numbers before the Russian invasion in Ukraine. A similar situation is observed with the areas transacted (Figure 2). In particular, on average ca. 10,000 ha was transacted monthly in 2023. In general, we observe signs of stabilization and recovery in terms of the transaction volumes.

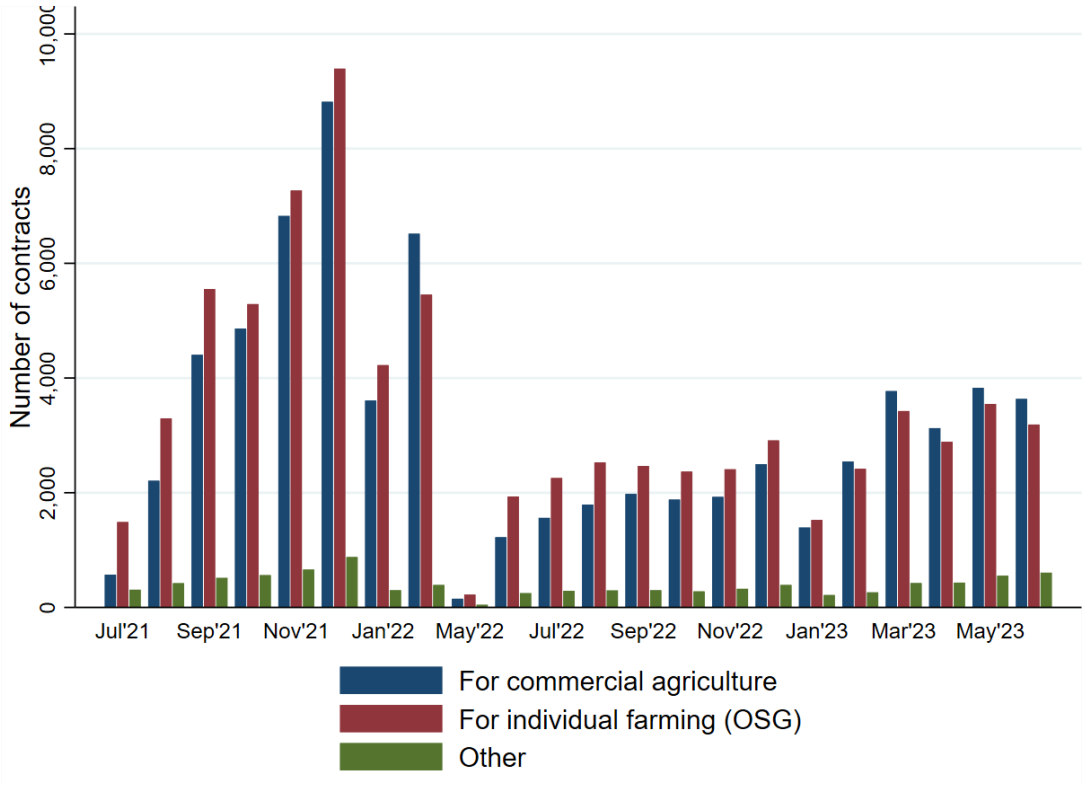

Figure 3. Temporal distribution of sales contracts for major types of agricultural land.

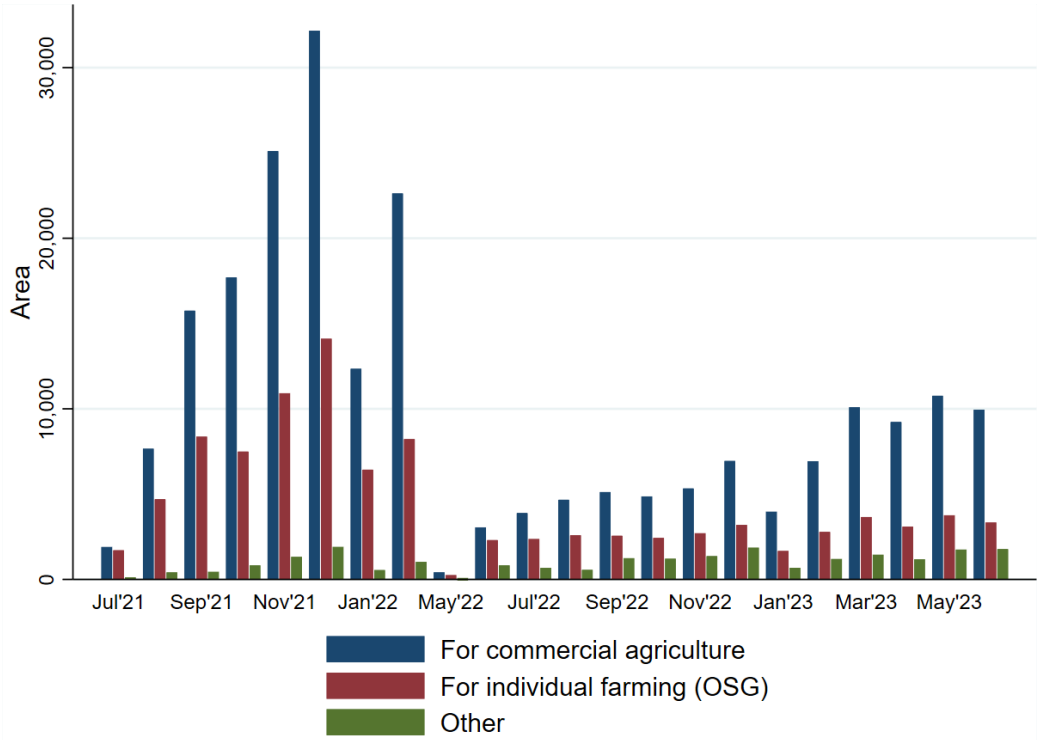

Figure 2. Temporal distribution of the areas transacted for major types of agricultural land.

The total turnover of agricultural land remains low in comparison to the reference countries. Thus, in two years, from the launch of the land sales market on July 1, 2021, until July 1, 2023, ca. 0.81% of all agricultural lands were transacted (ca. 341 thousand ha). The vast majority of the transacted land is represented by the land for commercial agriculture (ca. 220 thousand ha or 0.53% of the total agricultural lands) and OSG-land (ca. 99 thousand ha or 0.24% of the total agricultural lands). These are very modest figures in comparison to the typical 1-2% per year in European countries (Seifert, Kahle, and Hüttel 2021). Considering the highly restrictive design of the Ukrainian land sales market, this finding does not come as a surprise. With demand substantially higher due to the entry of legal entities into the market and the expansion of the ownership caps, the turnover is expected to grow substantially in 2024.

3.2 Missing price data

We paid special attention to missing price records in the previous APD land market studies and argued that it represented a large problem for effective land market monitoring (Kvartiuk & Martyn, 2021, 2022). Better data available within this study allows us to investigate how price reporting has been conducted since the launch of the sales market in 2021 (Figure 4). The "old" price records were not obligatory for notaries to register a transaction in the SRPRRE. As a result, we see that price reporting before the war was on the 50%-60% level. This was obviously an unsatisfactory situation as the whole purpose of the monitoring system was compromised. In response to these challenges, in May 2022, a new input field was designated for recording the agreed sales price of the plot in question. The old one was supposed to record the expert monetary valuation of a plot to be registered. We believe that this situation may have led to confusion among the notaries as they were not sure which values to be recorded. The User Instructions issued by the SRPRRE in 2023 for the notaries did not provide clear instructions to the notaries on this issue (SRPRRE, 2023). However, from January 2023 the new input field was made obligatory for transactions registration.

The situation with reporting improved dramatically in 2023 when contract price reporting became obligatory. Accordingly, we see a sharp increase in the shares of non-missing "new" price records starting with January 2023. By February 2023, the share of non-missing values for all types of land went up to over 99%. Despite a much fuller picture of the prices on the agricultural land sales market, we still observe some transactions with missing price values. SRPRRE should investigate how those transactions were possible despite the obligatory "new" price reporting.

The pattern of spatial distribution of the missing price values for the land for commercial agriculture is alarming because the most missing values are found in Kyiv oblast (79 plots) and Vynnytsia (67 plots). These are the regions with some of the most attractive lands. Interestingly, the field for "old" land price (designated for the expert monetary valuation) is still filled in 20%-25% of the time. Unfortunately, it appears that there is no uniform and clear understanding among the notaries about what should be recorded in this particular field.

Throughout the study, we use the "new" price records as they are clearly denoted as the sales price found in the contract. For the earlier observations for which no "new" prices are available, we use the "old" price records.

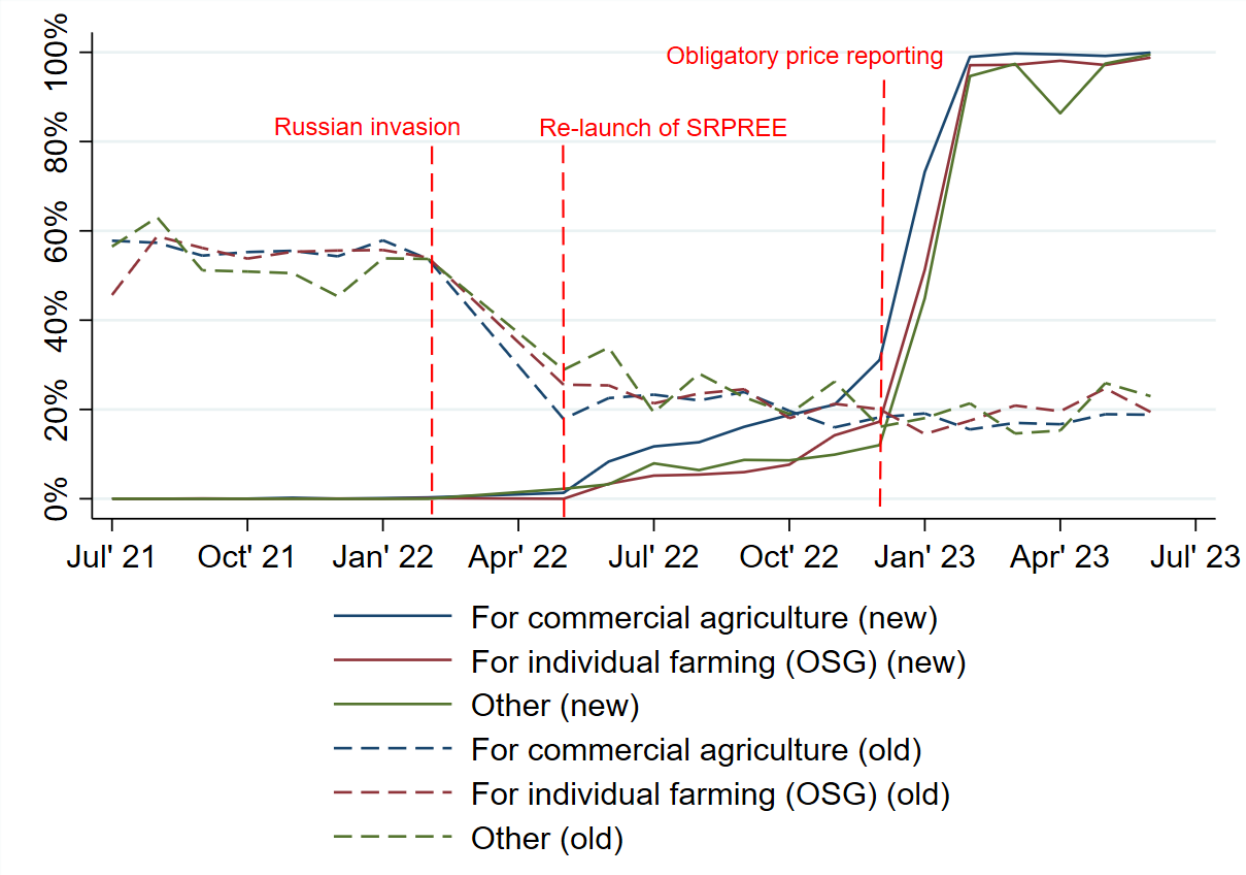

Figure 4. Shares of non-missing values for old and new price inputs in SRPRRE.

3.3 Spatial distribution of transactions

Figure 5 presents the spatial distribution of the sales transactions for the land for commercial agriculture (formerly under moratorium) in 2023. An immediate observation is that the transactions take place very close to the frontline but not on the occupied territories. Moreover, we find substantially fewer transactions in the frontline TCs. As we move away from these regions the number of contracts grows. A similar situation is observed with the areas transacted (Figure 6). It is also important to point out substantial gaps in land sales activity in Chernihiv region which was occupied during the initial stages of the Russian war against Ukraine. Mining pollution and high demining costs may hinder land sales in this region. Sumy was affected to a lesser extent and we see more sales activity in that oblast. However, we observe fewer transactions closer to the Russian border in these regions where some sporadic fighting has been taking place.

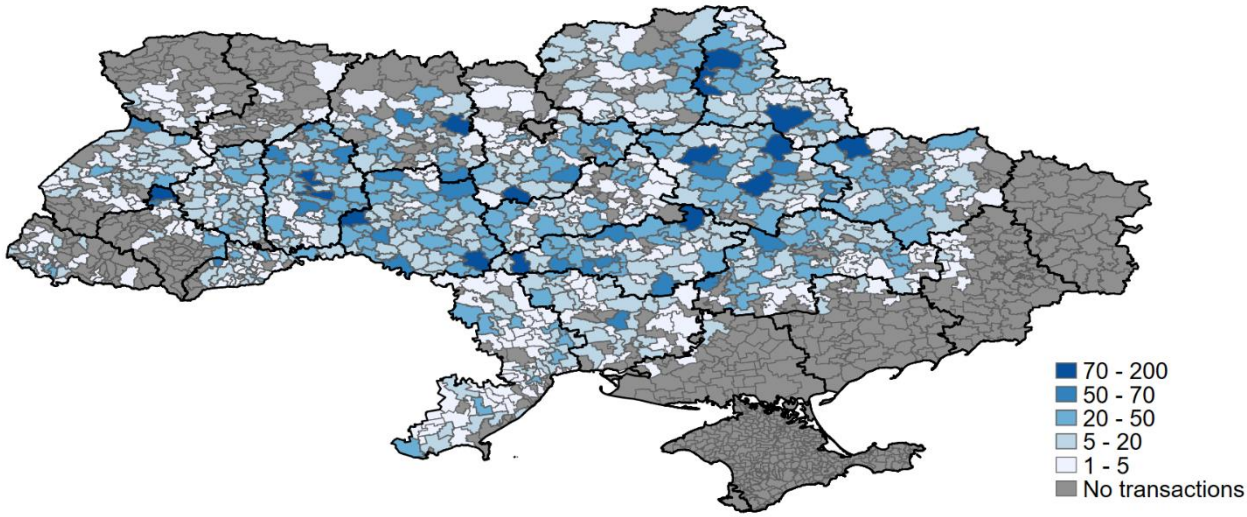

Figure 5. Spatial distribution of transactions with land for commercial agriculture in the first half of 2023.

To understand the dynamics of the land turnover by oblasts we need to consider three periods: before the war, after the invasion in 2022, and after the invasion in 2023.

Table 1 represents the shares of areas transacted by oblast and period. Before the Russian war, Kharkiv, Kherson, and Sumy oblasts were the leaders in sold land turnover. Because of the full-scale war, turnover patterns have shifted towards western regions. In 2022, Zakarpattia, Khmelnytsky, and Vynnytsia regions were leading the rating. In 2023, this trend continued except for the fact that Vinnytsia oblast was substituted by Dnipropetrovsk oblast where transaction

activity picked up dramatically as the frontline stabilized. It is also worth noting that transactions were nearly absent in Luhansk oblast because it was completely occupied. In Volyn and Rivne oblasts, although the total turnover is relatively high, we do not observe many transactions with the land for commercial agriculture. This is related to the fact that these areas represent predominantly forests with only limited agricultural activity. Thus, OSG-land accounts for the vast

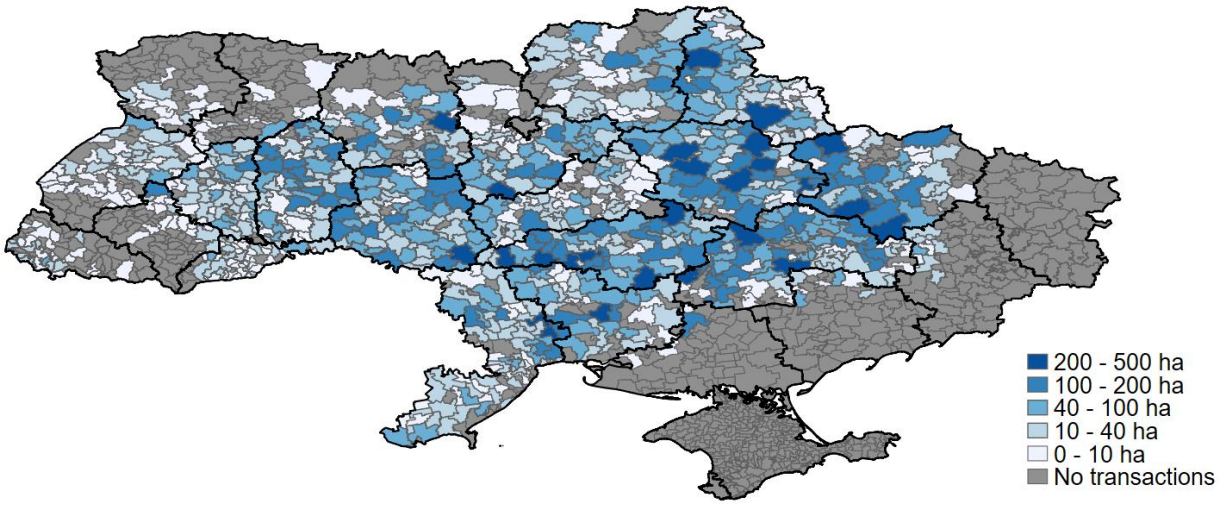

Figure 6. Spatial distribution of transacted areas of land for commercial agriculture in the first half of 2023.

majority of the transactions in these oblasts.

Table 1. Land turnover by oblast and period.

	Jul 1 – Feb 24, 2022		Feb 24 – Dec 31, 2022		Jan 1 – Jul 1, 2023	
Oblast name	**Total**	**For commercial agriculture**	**Total**	**For commercial agriculture**	**Total**	**For commercial agriculture**
Vinnytsia oblast	0.64%	0.37%	0.39%	0.21%	0.38%	0.24%
Volyn oblast	0.70%	0.05%	0.37%	0.02%	0.40%	0.03%
Dnipropetrovsk oblast	0.86%	0.66%	0.29%	0.20%	0.45%	0.35%
Donetsk oblast	0.58%	0.43%	0.01%	0.00%	0.03%	0.02%
Zhytomyr oblast	0.44%	0.20%	0.24%	0.16%	0.36%	0.24%
Zakarpattia oblast	0.61%	0.34%	0.53%	0.31%	0.50%	0.29%
Zaporizhia oblast	0.55%	0.38%	0.02%	0.01%	0.03%	0.02%
Ivano-Frankivsk oblast	0.16%	0.07%	0.17%	0.09%	0.17%	0.09%

Kyiv oblast	0.67%	0.32%	0.28%	0.16%	0.35%	0.19%
Kirovohrad oblast	0.84%	0.55%	0.33%	0.22%	0.37%	0.26%
Luhansk oblast	0.68%	0.63%				
Lviv oblast	0.25%	0.11%	0.20%	0.10%	0.19%	0.11%
Mykolayiv oblast	0.66%	0.42%	0.13%	0.08%	0.24%	0.18%
Odesa oblast	0.26%	0.17%	0.16%	0.10%	0.22%	0.15%
Poltava oblast	0.88%	0.52%	0.39%	0.19%	0.44%	0.29%
Rivne oblast	0.22%	0.03%	0.14%	0.02%	0.16%	0.02%
Sumy oblast	0.98%	0.65%	0.22%	0.15%	0.38%	0.26%
Ternopil oblast	0.32%	0.24%	0.24%	0.17%	0.26%	0.19%
Kharkiv oblast	1.78%	1.40%	0.09%	0.07%	0.27%	0.22%
Kherson oblast	1.20%	0.98%			0.01%	0.01%
Khmelnysky oblast	0.75%	0.43%	0.53%	0.30%	0.52%	0.35%
Cherkasy oblast	0.39%	0.20%	0.18%	0.10%	0.18%	0.11%
Chernivtsi oblast	0.38%	0.28%	0.29%	0.23%	0.32%	0.26%
Chernihiv oblast	0.64%	0.35%	0.17%	0.08%	0.26%	0.16%

Note: Highlighted cells represent top 3 oblasts with the highest turnover during a given period.

We also address the discussion about how and where agricultural enterprises are involved in purchasing agricultural land awaiting access to the market in 2024. In particular, we can observe enterprises' behavior on the market of agricultural land that has a purpose other than for commercial agriculture (not accessible for legal entities yet) according to the Classification of the Types of Land Purposes (CTLP). On the market of the currently traded land, agricultural enterprises accounted for only 1.56% of all the transactions (individuals accounted for 98.13% of all the transactions). Even though enterprises are excluded from purchasing land for commercial agriculture, this share is surprisingly low since OSG-land can be purchased by enterprises in principle. Considering the public's expectation of a higher purchasing power by enterprises, we would expect higher participation in the OSG-land market from their side. Table 2 presents the shares of agricultural land purchased by enterprises during the three periods as above. We see that the shares purchased with respect to the total oblast agricultural land are minuscule in comparison to the transaction activity by individuals. Nevertheless, it is informative to identify the oblasts where enterprises are the most active on the market of agricultural land that is currently available to them. The top three oblasts for each period are shaded. Before the war, the oblasts with the

most transactions by enterprises were Odesa, Kyiv, and Poltava oblasts. After the Russian war began, Odesa's transactions went to nearly zero. Lviv and Dnipropetrovsk oblasts were among the leaders during the war. However, Kyiv and Poltava retained their leadership as some major enterprises operate in these oblasts.

Table 2. Turnover of agricultural land purchased by agricultural enterprises by oblasts and periods.

	Jul 1 – Feb 24 , 2022		**Feb 24 – Dec 31, 2022**		**Jan 1 – Jul 1, 2023**	
Oblast	**Share (%)**	**Total (ha)**	**Share (%)**	**Total (ha)**	**Share (%)**	**Total (ha)**
Vinnytsia oblast	.002 %	31.07 ha	0 %	0 ha	.0003 %	4.62 ha
Volyn oblast	.019 %	114.18 ha	.001 %	4.37 ha	.0001 %	.54 ha
Dnipropetrovsk oblast	.003 %	61.17 ha	.003 %	51.93 ha	.001 %	26.00 ha
Donetsk oblast	.0004 %	3.97 ha	0 %	0 ha	0 %	0 ha
Zhytomyr oblast	.002 %	25.89 ha	.005 %	51.42 ha	.003 %	31.13 ha
Zakarpattia oblast	.005 %	8.20 ha	.003 %	5.18 ha	.005 %	8.05 ha
Zaporizhia oblast	.001 %	19.92 ha	0 %	0 ha	.0002 %	3.71 ha
Ivano-Frankivsk oblast	.002 %	6.54 ha	.003 %	9.98 ha	.00003 %	.11 ha
Kyiv oblast	.021 %	251.70 ha	.008 %	93.66 ha	.007 %	77.13 ha
Kirovohrad oblast	.004 %	72.58 ha	.002 %	40.55 ha	.0003 %	4.3 ha
Luhansk oblast	0 %	0 ha	0 %	0 ha	0 %	0 ha
Lviv oblast	.017 %	117.90 ha	.016 %	110.72 ha	.002 %	10.36 ha
Mykolayiv oblast	.0006 %	10.00 ha	0 %	0 ha	0 %	0 ha
Odesa oblast	.002 %	275.94 ha	0 %	0 ha	.0002 %	3.59 ha
Poltava oblast	.014 %	249.81 ha	.019 %	325.29 ha	.0009 %	15.58 ha
Rivne oblast	.0007 %	4.21 ha	.00003 %	.17 ha	.0000006 %	.04 ha
Sumy oblast	0 %	0 ha	.0001 %	1.35 ha	0 %	0 ha
Ternopil oblast	.0008 %	6.72 ha	.0002 %	2.00 ha	.0005 %	4.00 ha
Kharkiv oblast	.002 %	27.43 ha	0 %	0 ha	.00003 %	.50 ha
Kherson oblast	.002 %	22.72 ha	0 %	0 ha	0 %	0 ha
Khmelnysky oblast	.013 %	160.06 ha	.00005 %	.56 ha	.0002 %	2.73 ha
Cherkasy oblast	.001 %	11.56 ha	.001 %	17.57 ha	.00007 %	.85 ha
Chernivtsi oblast	0 %	0 ha	0 %	0 ha	0 %	0 ha
Chernihiv oblast	.002 %	32.60 ha	.001 %	14.35 ha	0 %	0 ha

Note: Highlighted cells represent top 3 oblasts with the highest turnover during a given period.

3.3 Land prices

3.3.1 Price dynamics

To make meaningful conclusions about the development of land prices over the last months, we restrict our sample in a number of ways. In doing so, we are ensuring that we are comparing land plots with comparable characteristics. First, we make a distinction between the prices for OSG-land and land for commercial agriculture (two major types of agricultural land). Second, we focus only on arable land excluding hayfields and pastures as well as plots for gardening and other purposes. Third, we examine the median prices because a small number of outliers with very large prices per ha distort the average values substantially. These abnormally expensive land plots are most likely to be used for non-agricultural purposes. The conversion of agricultural land for development purposes obviously distorts the statistics of prices for agricultural land itself. In the future, when a substantial volume of information regarding the functional zoning of community territories is integrated into the State Land Cadastre, it may be advisable to omit information related to transactions involving land plots situated in non-agricultural development zones from the analysis.

Figure 7 presents the price dynamics from July 1, 2021, until July 1, 2023. Right after the launch of the sales market, the median prices for OSG-land went substantially below the prices for land for commercial agriculture. This may be explained by a substitution effect as the market players' attention was distracted by the newly available land that was formerly under the moratorium. However, the prices appear to have caught up and stabilized at around 35,000 UAH per ha in the beginning of 2023. Surprisingly, the beginning of the Russian war against Ukraine does not appear to have affected nominal prices visibly. However, observing CPI-deflated prices, we see a substantial decline from ca. 1100 USD per ha before the invasion to ca. 950 USD per ha thereafter.

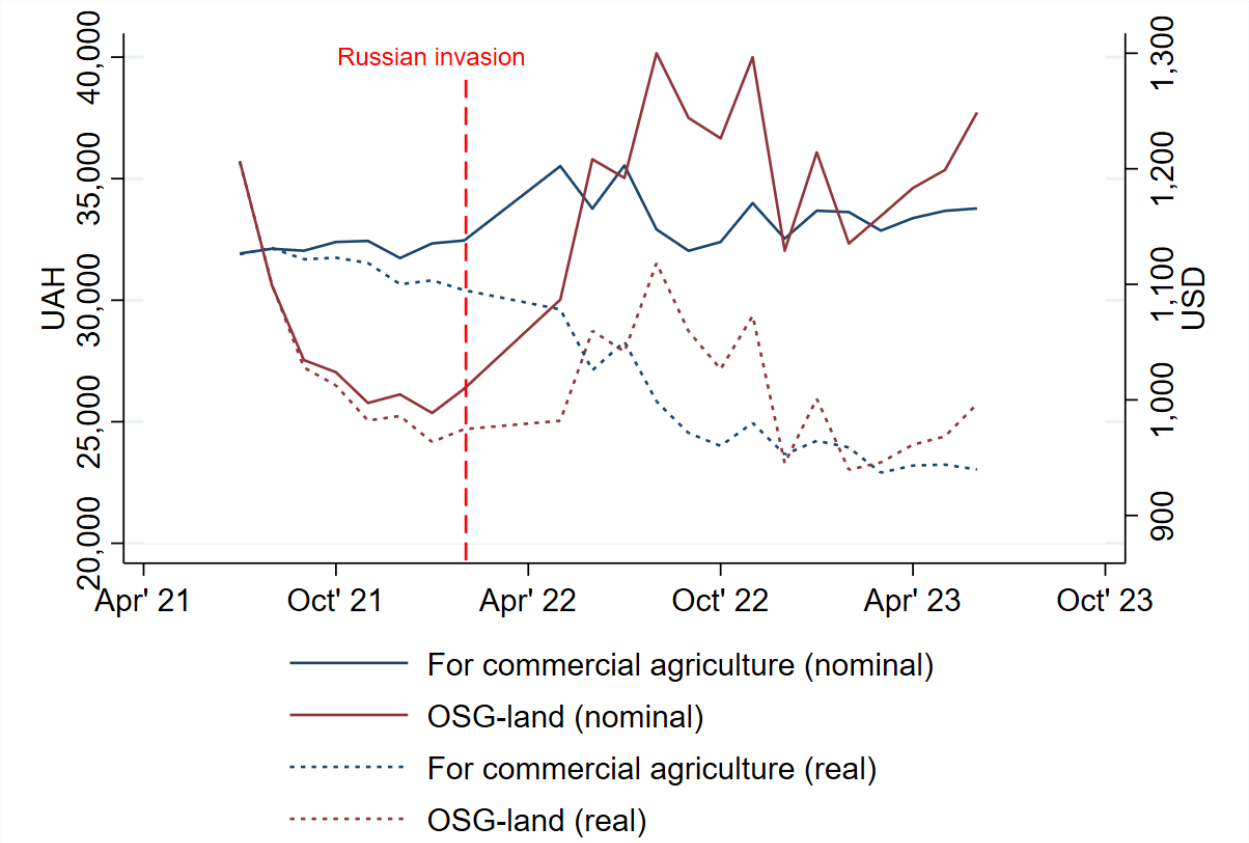

Figure 7. Nominal and real median sales price for the major types of agricultural land.

3.3.2 Distress sales and markups

Following the APD Study from 2022 (Kvartiuk & Martyn, 2022), we quantify nominal price discounts in the frontline oblasts to test whether distress sales occurred. In particular, we set up a hedonic-type Tobit model where a logarithm of the sales price is a function of the plots' characteristics and includes a dummy reflecting the observations after the invasion. We re-estimate the models from the end of 2022 with additional data until July 1, 2023, to see if we still can observe nominal price discounts in the frontline regions (consult Appendix B for estimation details). With more available data, the goal would be to compare if the price discounts identified in 2022 have persisted, got larger, or smaller.

	Whole country	Affected oblasts	Chernihiv	Kharkiv	Sumy	Zaporizhia	Myko-layiv

Jul 1, 21 –	0.022*	-0.036	-0.247***	-0.066***	-0.048	-0.030***	0.158***
Nov 1, 2022	(0.075)	(0.204)	(0.000)	(0.000)	(0.252)	(0.006)	(0.004)
Jul 1, 21 –	0.029***	-0.046***	-0.045**	-0.005	-0.139***	-0.008	0.079***
Jul 1, 2023	(0.000)	(0.000)	(0.033)	(0.685)	(0.000)	(0.730)	(0.000)

Table 3 presents estimated coefficients on different datasets. First, we see that nominal prices increase after the war went up from 2.2% at the end of 2022 to 2.9% in mid-2023. This could be associated with inflationary processes as well as average price increases. We see that the effect of price discounts in the affected oblasts has become more pronounced because end of 2022 we did not observe any significant effects and now there is a statistically significant 4.6% discount in the five affected oblasts. The large (almost 25%) price discount in Chernihiv oblast is now much more moderate (4.6%) which indicates a slow recovery of the previously occupied territories. Kharkivska oblast does not display a 6.6% price discount anymore and the recent effect is close to zero. This may be explained by the stabilization of the frontline and the general reduction of risks from the side of the Russian military. We find alarming signs from Sumy oblast where the prices were statistically similar before and after the invasion at the end of 2022 and now we find an almost 14% discount. This may be related to the military instability in the region and periodic attacks from across the border. In Zaporizhia, we do not find a significant discount anymore which may be related to the frontline stabilization as well. Finally, Mykolayiv oblast's premium of 16% at the end of 2022 is now substituted by an 8% premium which is still impressive considering the active fighting in the neighboring Kherson oblast.

Table 3. Estimated coefficients of the war-induced changes in nominal sales prices.

	Whole country	**Affected oblasts**	**Chernihiv**	**Kharkiv**	**Sumy**	**Zaporizhia**	**Myko-layiv**
Jul 1, 21 –	0.022*	-0.036	-0.247***	-0.066***	-0.048	-0.030***	0.158***
Nov 1, 2022	(0.075)	(0.204)	(0.000)	(0.000)	(0.252)	(0.006)	(0.004)
Jul 1, 21 –	0.029***	-0.046***	-0.045**	-0.005	-0.139***	-0.008	0.079***
Jul 1, 2023	(0.000)	(0.000)	(0.033)	(0.685)	(0.000)	(0.730)	(0.000)

Because NMV represents a reference price value and the lowest possible price[2] for the land for commercial agriculture, it is informative to investigate the dynamics of the markups or mark-downs. **Помилка! Джерело посилання не знайдено.** presents the average and median

[2] It is important to highlight that even with the high inflation rate of 26.6% in 2022, the tax legislation changes in 2021 did not include the indexation of the NMV for the period 2017-2022. This decision effectively maintained the minimum price for agricultural land. If the NMV is indexed in 2023, we can anticipate corresponding price increases in transactions that were conducted at the 'minimum allowed' price in 2024.

markups for both, OSG-land and land for commercial agriculture. We see that median markups are very close to zero meaning that the vast majority of the land plots of both types are sold at the NMV. In fact, we find 22.7% of these transactions to have a price equal to NMV and for another 47.2% of transactions, the markup appears to be less than 10%. On the other hand, average markups have increased substantially but substantially more so for the OSG-land. We

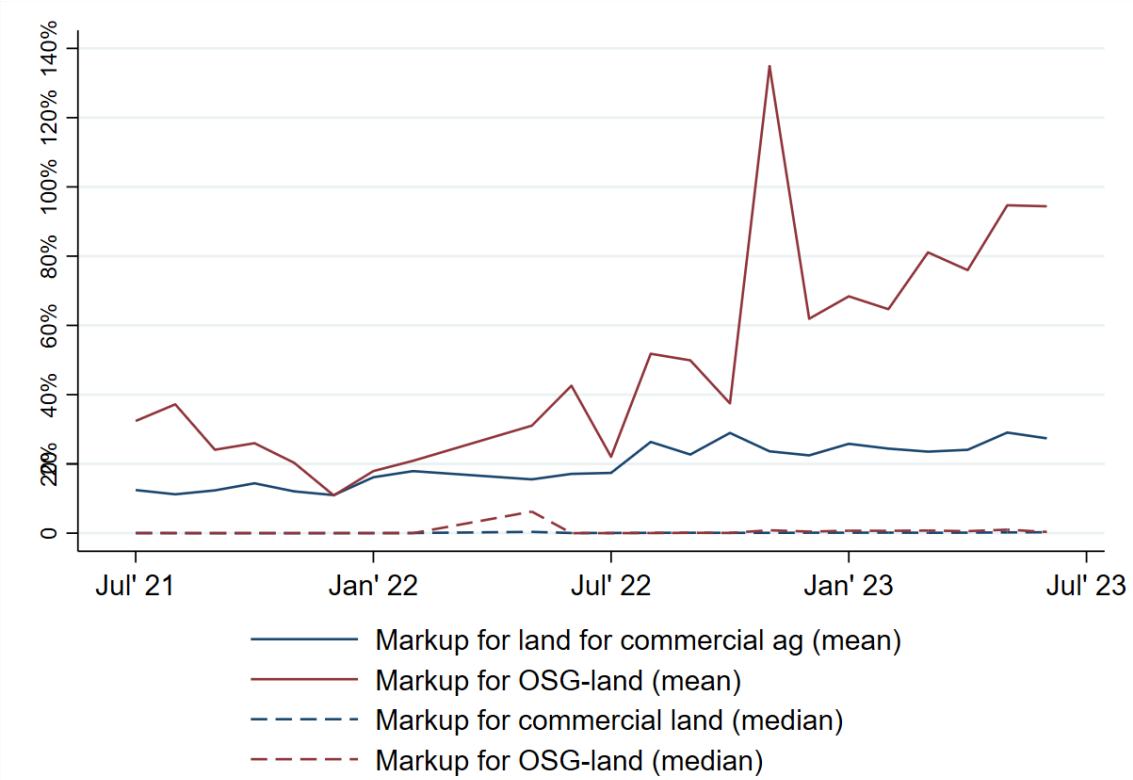

Figure 8. Monthly average and median markups above the NMV.

see an initial dip in the markups corresponding to the median price reductions end of 2021 for the OSG-land and then a substantial recovery outpacing the land for commercial agriculture. Similarly, we find 18% of the transactions with OSG-land to have a zero markup and another 30.5% - less than 10% markup. In general, we see that competitiveness on the land sales market is increasing but slowly. We also expect the markups of the land for commercial agriculture to increase substantially paralleling the situation with the OSG-land which has been traded for decades.

Similar to the previous APD study on the sales market (Kvartiuk & Martyn, 2022), we check whether land for commercial agriculture was traded below NMV which should be a safeguard against distress sales. Despite the legislation, we find a total of 882 transactions (2.4% of the

total transactions with price records) with the sales price below NMV. We observe these transactions before and after the war. The top three oblasts with these transactions are Chernivetsi (12.36%), Sumy (9.30%), and Khmelnytska (8.84%) oblasts. A closer inspection is required to better understand how these transactions were possible.

3.3.3 Spatial prices distribution

Closer inspection of the average prices on the level of territorial communities (ATCs) may reveal further details of the land prices distribution. Thus, Figure 9 demonstrates the average prices for arable land for commercial agriculture in the ATCs where at least one transaction took place. First, we observe a clear pattern of higher prices in the western regions as the war-related risks may have an effect in the eastern parts of the country. Although oblasts with traditionally intensive agriculture demonstrate relatively high prices as well. Similar to the previous studies from 2021 and 2022 (Kvartiuk & Martyn, 2021, 2022), we observe clusters of higher prices around large cities (e.g., Lviv, Kyiv). This may indicate a consequent intention of the buyers to convert agricultural land into non-agricultural purposes that could potentially generate higher profits. Second, we do not observe any transactions on the occupied territories. Third, prices appear to be lower in the areas close to the frontline as well as close to the border with Russia. Finally, TCs marked with sandy color represent the cases where no single transaction had a recorded price. Although price reporting substantially improved as was argued in Subsection 3.2, we observe two TCs close to Kyiv where price recording failed: Dymerska and Dmytrivska TCs. A closer inspection is required to understand the reasons behind this and to avoid this in the future.

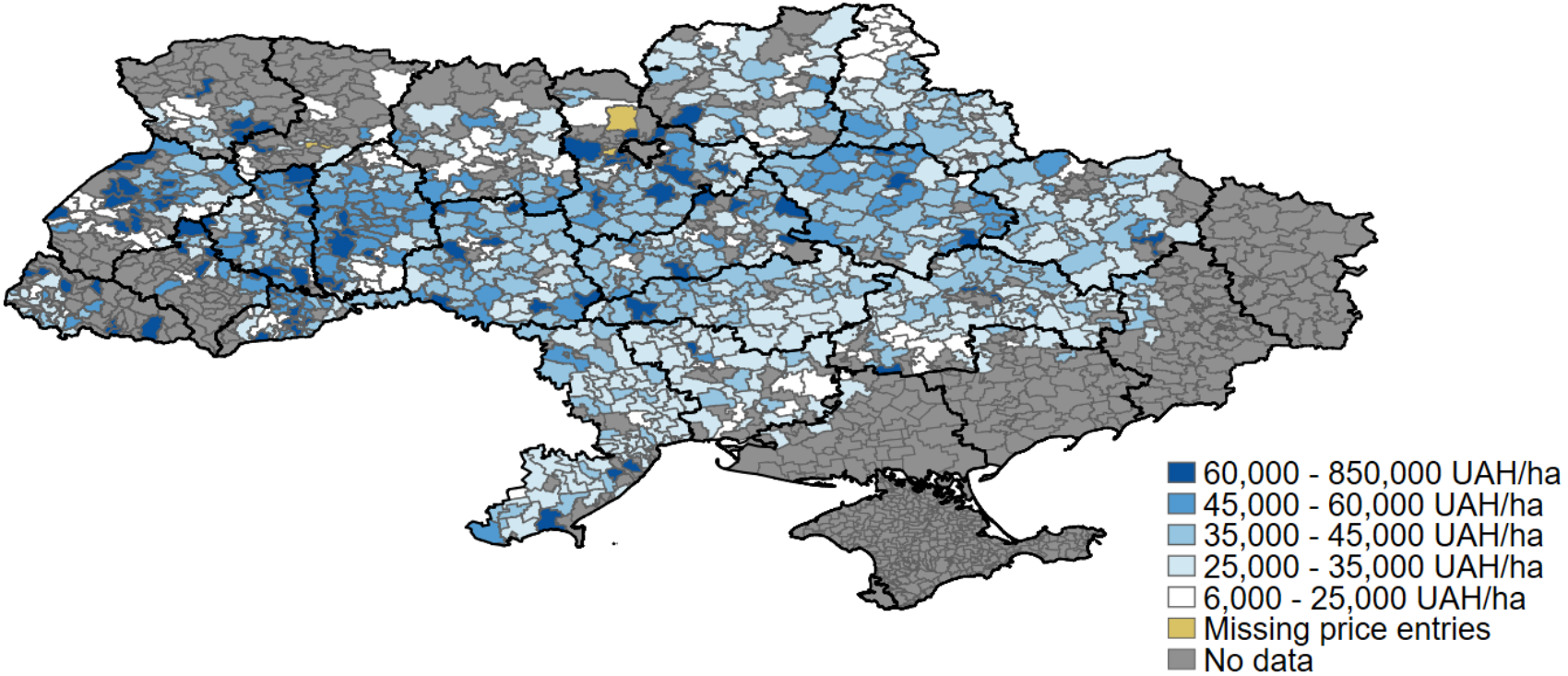

Figure 9. Average land sales prices per municipality (arable land for commercial agriculture only).

3.3.4 Willingness to pay by different entities

We examine the behavior of different market players on the example of the OSG-land purchasing patterns. All the market players have access to OSG-land except that legal entities can only purchase those OSG-plots that were privatized within the free privatization stipulated by the Land Codex. However, they are not different from the OSG-land plots distributed as 'pais' in the 1990s. This allows us to investigate the differences in willingness to pay between different types of entities. In particular, we set up a standard hedonic-type pricing model:

$$Price_i = \beta_0 + \beta_1 Entity_i + \beta_2 Controls_i + u_i,$$

where $Price_i$ is the logarithm of the price of a given land plot. Then, $Entity_i$ is a vector of dummies representing different entities: individuals, state bodies, agricultural enterprises, and individual farmers. We also control for a number of plots' characteristics including NMV, area, and whether it represents hayfields and pastures. In our sample, 74,561 transactions were conducted by individuals; only 40 – by state bodies; 1,239 – by agricultural enterprises; and 193 – by individual farmers. We construct four specifications on the samples with individuals as the base group and then we add observations for the corresponding entity. This way we can make pairwise comparisons of the willingness to pay with respect to individuals.

Table 4 presents the results of our estimations. We see that agricultural enterprises pay 43.3% more than individuals for plots of the same size, NMV, and in the same location. This reflects enterprises' higher willingness to pay and indicates that the demand for land will grow substantially after enterprises obtain full access to the market. Interestingly, we do not find any statistically significant premium by the individual farmers. This suggests that their behavior on the land sales market may be very similar to their individual behavior. Furthermore, we find that the state bodies (TCs and local branches of the SGC) paid 176% more than individuals. This figure however should be treated with caution because there were only 40 observations with the state bodies as buyers which makes statistical predictions challenging. Finally, focusing exclusively on the sample with individuals, we did not find any differences in the bargaining power between women and men.

Table 4. Estimations of the willingness to pay for OSG-land by different entities.

	(1) Tobit	(2) Tobit	(3) Tobit	(4) Tobit
Dummy for ag enterprise	0.433*** (0.000)			
Dummy for individual farmer		0.119 (0.127)		
Dummy for state body			1.756*** (0.000)	
Sex (1 – male; 0 – female)				0.006 (0.216)
NMV per ha	0.000*** (0.003)	0.000*** (0.003)	0.000*** (0.003)	0.000*** (0.000)
Area (ha)	-0.042*** (0.001)	-0.042*** (0.001)	-0.042*** (0.001)	-0.012*** (0.000)
Dummy for hayfields and pastures	-0.652*** (0.000)	-0.670*** (0.000)	-0.671*** (0.000)	-0.436*** (0.000)
Oblast dummies	Yes	Yes	Yes	Yes
Constant	10.215*** (0.000)	10.231*** (0.000)	10.232*** (0.000)	9.814*** (0.000)
Observations	27542	27222	27170	41777

*Significant at 0.1; **Significant at 0.05; ***Significant at 0.01. P-values are reported in brackets.

4. Land concentration

We utilize the same openly available data as in the previous APD studies on the Ukrainian land market (Kvartiuk & Martyn, 2021, 2022). In particular, we mostly work with two datasets published by the SGC that contain all individual landowners with more than 20 ha of owned agricultural land and all legal entities with more than 100 ha. Moreover, using the transaction-level data, we are able to match owned plots with the ones acquired after July 1, 2021. This provides us with clues about the areas purchased by individuals with more than 20 ha and legal entities with more than 100 ha after the launch of the sales market.

4.1 Individuals

Figure 10 represents Kernel densities of individual land ownership at three different points of time: September 6, 2021 (blue line); October 31, 2022 (green line); and August 14, 2023 (red line). As the first two densities are portrayed in the previous studies, we are interested in the latest line showing how the ownership configuration has changed in the last half a year. The short answer is – not much. We see that the red line nearly coincides with the green line with the only

exception for the 100 ha area where the bulge appears to be higher. This is an indication that more individuals have accumulated landholdings just under the current legal cap of 100 ha. On the other hand, the bulges above 100 ha tend to get smaller which indicates that individuals with large areas in the ownership gradually reduce their land holdings. As a result, we observe gradual stabilization in terms of land accumulation.

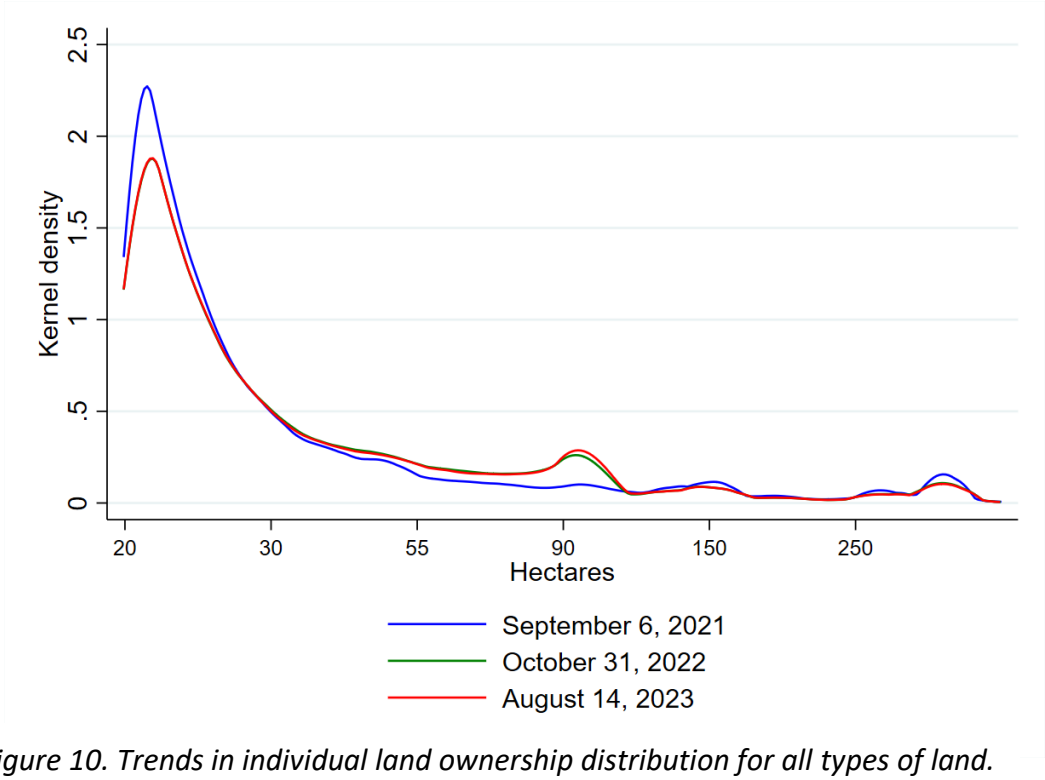

Figure 10. Trends in individual land ownership distribution for all types of land.

We do not observe increases in land concentration by individuals. Figure 11 presents the shares of oblast agricultural land owned by individuals with more than 100-ha holdings as of August 14, 2023. Comparing this choropleth map to the analogous one from the end of 2022, we do not find many differences. We see that some of the oblasts have slightly reduced land concentration. Before turning to concentration changes, we find that Odesa and Cherkasy regions have the most concentrated agricultural land by individuals. Western Ukraine appears to be the least concentrated probably due to the smaller average parcel size. Interestingly, we did not find a single individual who would own more than 100 ha in Chernivtsi oblast which was not the case just a year ago.

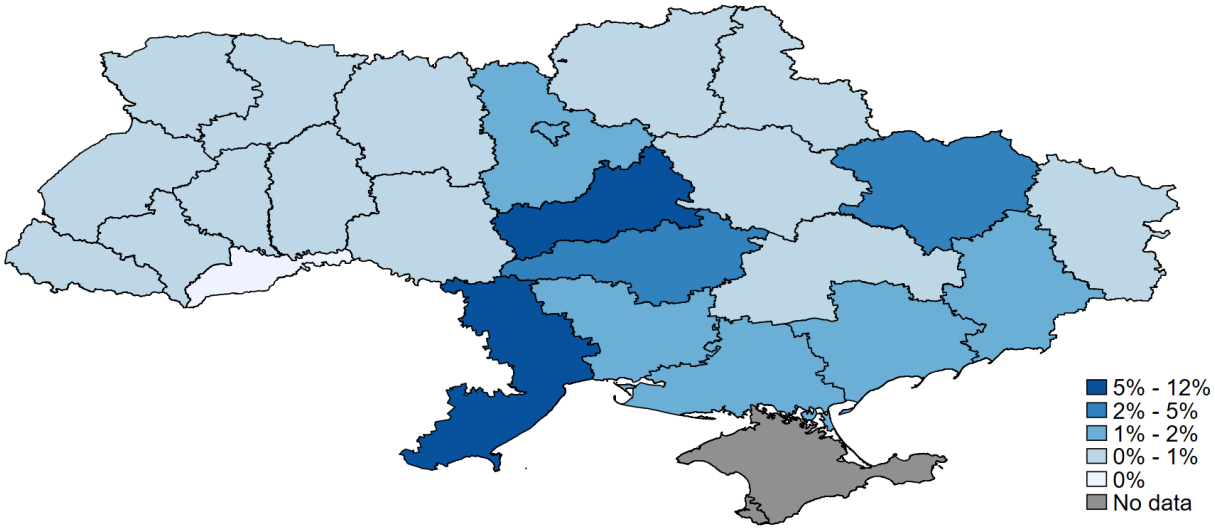

Figure 11. Shares of agricultural land owned by individuals with land holdings larger than 100 ha.

We find concentration trends during the first year after the launch of the sales market with a consequent deconcentration after the Russian invasion. Table 5 presents the changes in the shares of agricultural land owned by individuals with land holdings of more than 100 ha. In the first period (September 6, 2021, until October 31, 2022), we observe concentration trends in every single oblast with Kyiv and Mykolayiv oblasts being the leaders in terms of concentration pace. However, concentration rates appear to drop substantially in 2023. Thus, we observe decreases in the shares of agricultural land owned by individuals with land holdings of more than 100 ha almost in every single oblast. Interestingly, we observe decreasing trends in the most concentrated regions – Odesa and Cherkasy. However, these trends are pertinent to a number of other oblasts. Distress sales could be one of the reasons for so many individuals to reduce their land holdings.

Table 5. Changes in land concentration by individuals.

	Period 1	**Period 2**
Oblast	**Δ (Sep 6, 21 - Oct 31, 22)**	**Δ (Oct 31, 22 - Aug 14, 23)**
Vinnytsia oblast	0.35%	-4.76%
Volyn oblast	0.03%	-1.14%
Dnipropetrovsk oblast	3.87%	-10.65%
Doetsk oblast	2.41%	-7.25%

Zhytomyr oblast	0.84%	-5.26%
Zakarpattia oblast	0.23%	-1.39%
Zaporizhia oblast	1.18%	-7.22%
Ivano-Frankivsk oblast	0.02%	-0.10%
Kyiv oblast	6.43%	-14.19%
Kirovohrad oblast	3.48%	-17.96%
Luhansk oblast	0.63%	-2.61%
Lviv oblast	0.01%	-0.02%
Mykolayiv oblast	6.57%	-14.02%
Odesa oblast	2.64%	-16.78%
Poltava oblast	1.96%	-5.50%
Rivne oblast	2.06%	0.11%
Sumy oblast	1.40%	-4.65%
Ternopil oblast	1.16%	-2.28%
Khrakiv oblast	3.20%	-13.06%
Kherson oblast	3.88%	-12.59%
Khmelnytsky oblast	4.80%	-9.00%
Cherkasy oblast	1.73%	-9.62%
Chernivtsi oblast	0.00%	0.00%
Chernihiv oblast	2.00%	-4.25%

4.2 Legal entities

The number of legal entities owning more than 100 ha went down substantially (from 338 in October 2022 to 305 entities in August 2023). Figure 12 presents the distributions of major entity types over the three periods of time. The share of companies has been stable over time and accounted for three-fourths of all large landowners. A similar situation is observed with individual farms and cooperatives with one-tenth and one-twentieth of all landowners with more than 100 ha, respectively. Interestingly, SGC and local governments reduced their land holdings slightly. Also, we do not find educational institutions in the list of large landowners.

Banks deserve special attention as their land ownership trends may represent a clue about the collateralization of land in access to credit. Figure 13 presents the dynamics of land ownership by banks with holdings over 100 ha. Current legislation stipulates that banks can possess land for two years in case of debt foreclosure and are obliged to sell it within this period. We see that banks "Akord" and "Export-Import" were the largest owners of agricultural land in Ukraine. For instance, the latter possessed almost 300 ha during the second half of 2022. For these two banks, we see changes in the number of plots and the total area owned over time meaning that banks

obtain and dispose of land plots on the market. For bank "Akord", we see that the line stops shortly before 2023 meaning that its holdings went below 100 ha.

The other three banks had smaller and more stable land holdings. We also find differences in average plot size between the banks "Akord" and "Export-Import" and the rest of the banks. On average larger land plots suggest that the latter banks work with the land for commercial agriculture whereas the rest may focus on OSG-land because the corresponding market may be more liquid. However, we would expect more changes in the land ownership in the case of a liquid market. Stable ownership patterns persisting for more than a year suggest that there could be challenges for the banks to dispose their land plots. Additional demand expected in 2024 due to the further liberalization step should improve the situation substantially.

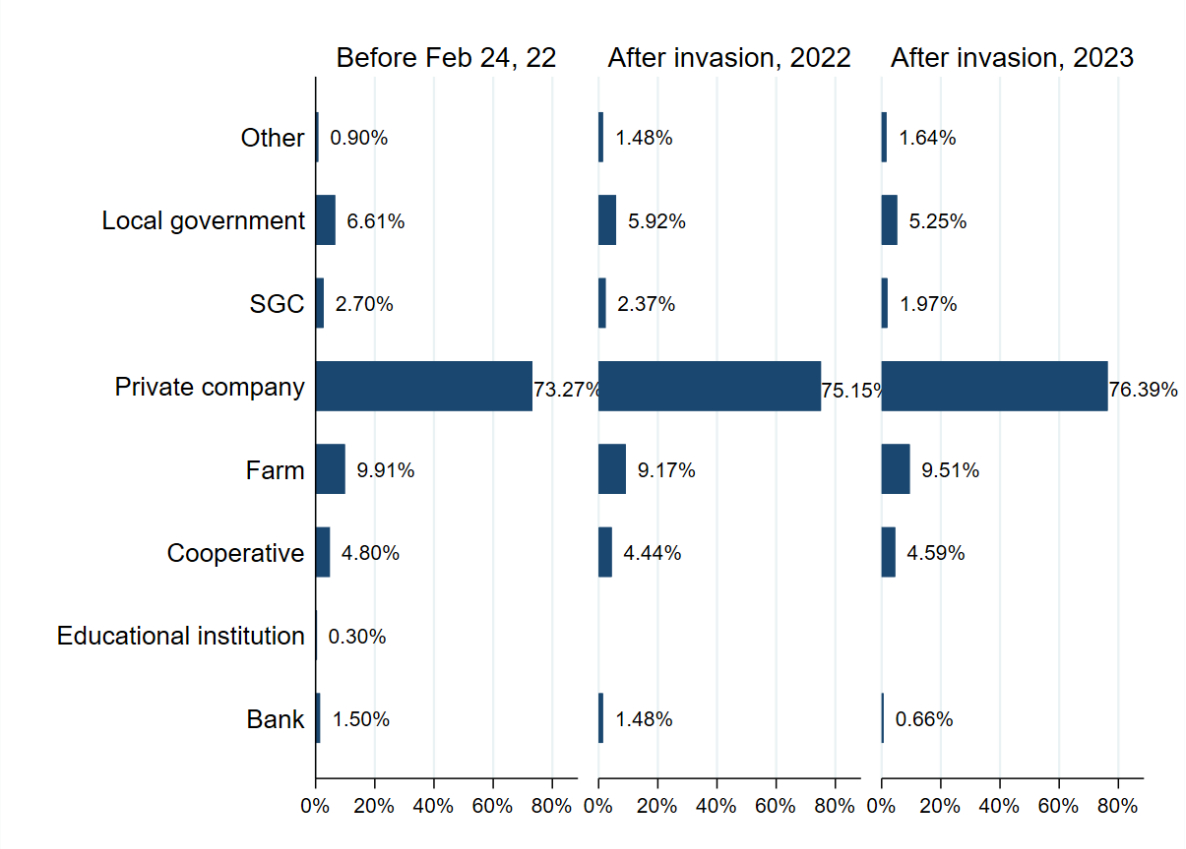

Figure 12. Entities owning more than 100 ha by type.

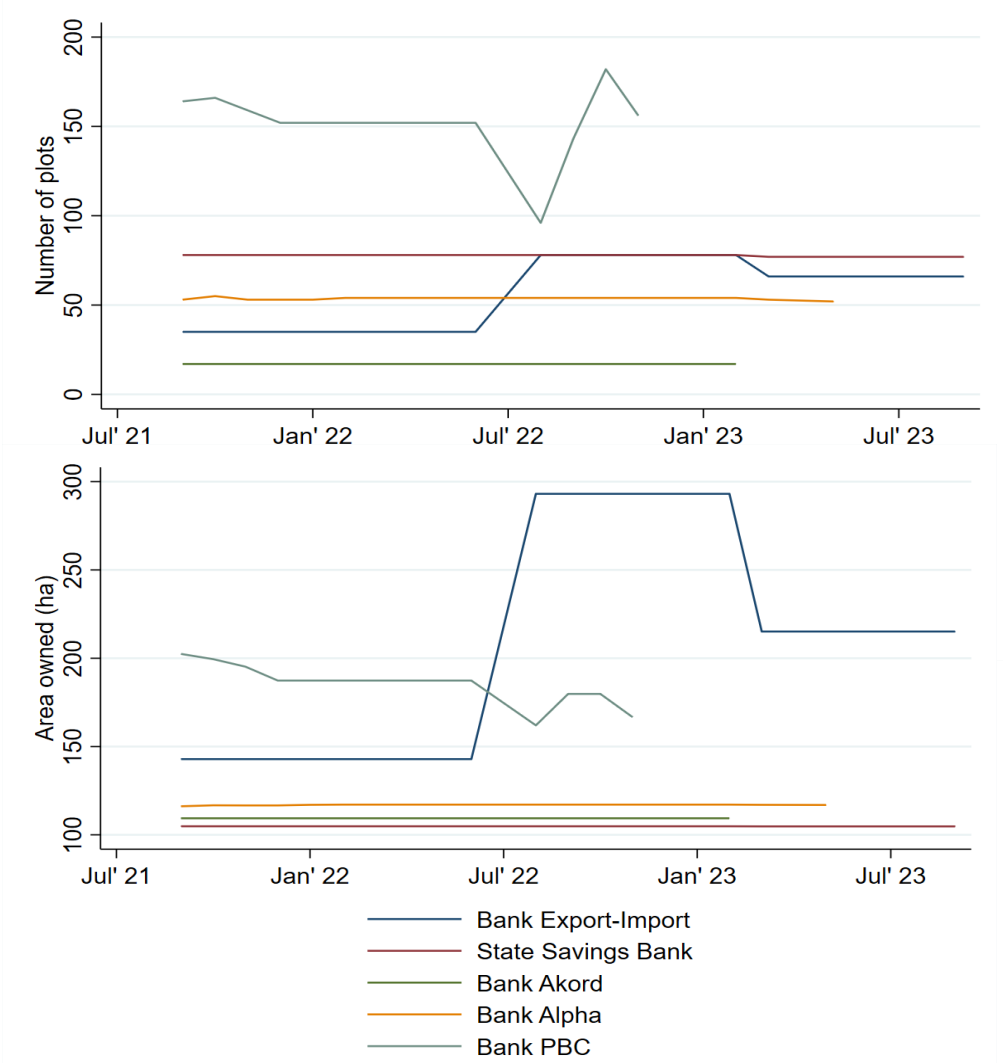

Figure 13. Dynamics of land ownership by banks with more than 100 ha.

Figure 14 presents the distribution of agricultural land ownership by legal entities with more than 100 ha at three different points in time. We see that the three lines are nearly identical suggesting that legal entities adjust their land ownership only slightly. The reasons is that they are excluded from the main agricultural land market until 2024 and probably use OSG-land in the holdings adjustments.

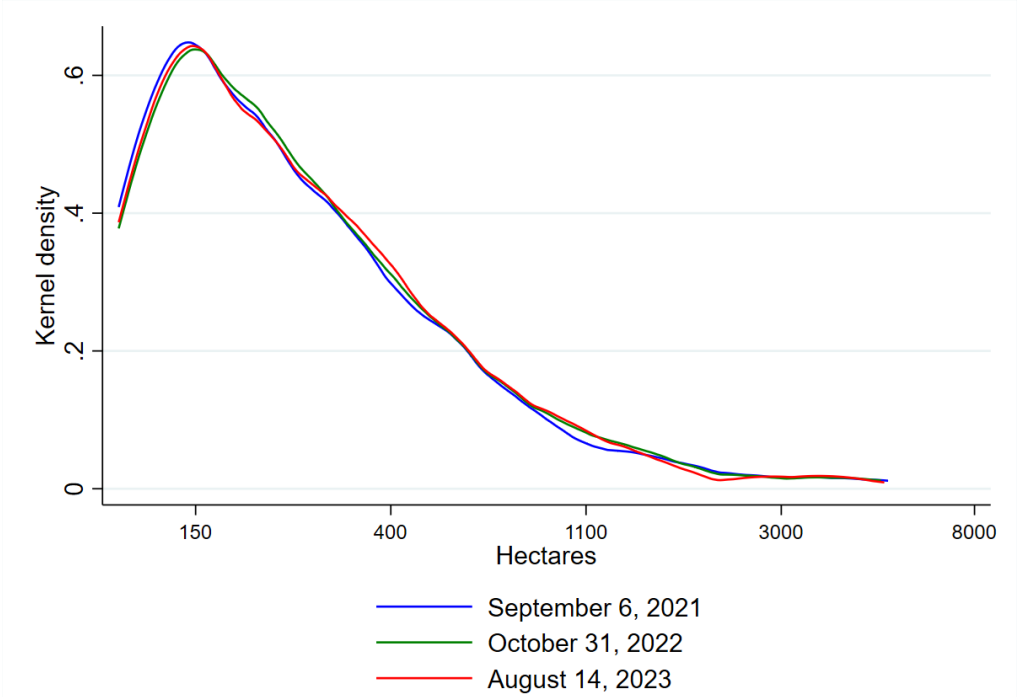

Figure 14. Distribution of agricultural land ownership by entities with more than 100 ha.

Figure 15 presents the shares of agricultural land owned by legal entities with at least 100 ha by oblasts. We see that the concentration is moderate and is almost identical to the situation end of 2022 (Kvartiuk & Martyn, 2022). Zhytomyr and Kyiv oblasts are still the leaders in owned land concentration by entities but we observe some signs of concentration reduction in these oblasts.

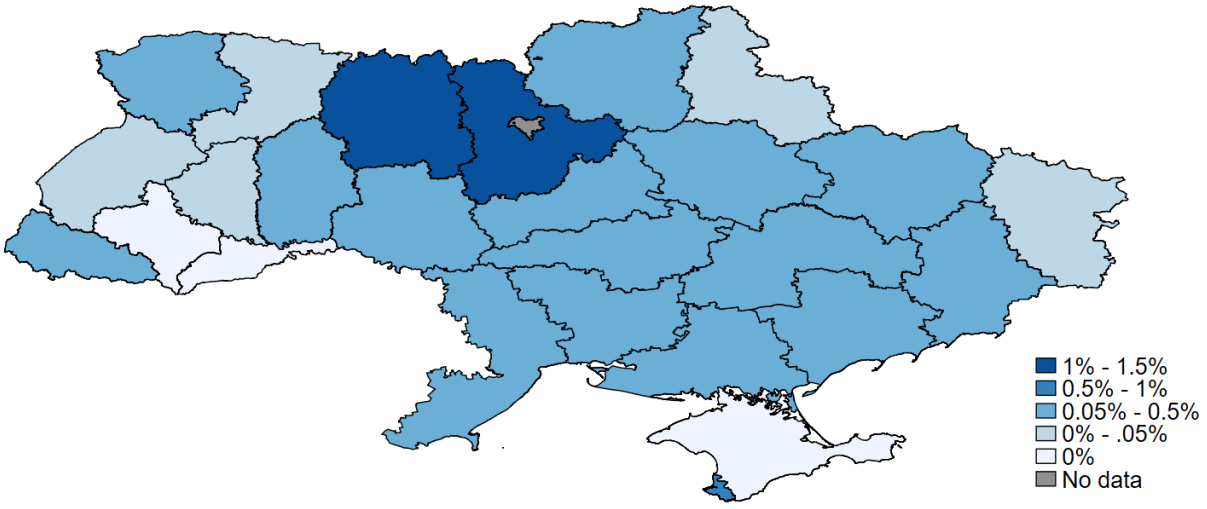

Figure 15. Shares of agricultural land owned by legal entities with more than 100 ha.

Although not so pronounced, we observe a similar picture with the concentration dynamics as in the case with individuals (Subsection 4.1). In particular, Table 6 demonstrates that during the first period (until the end of 2022), we observe a modest concentration of agricultural land by legal entities. During the second and more recent period, we see reductions in the shares owned by legal entities with at least 100 ha. These trends may be caused by worsening economic conditions pushing undercapitalized farmers to reduce their land holdings.

Table 6. Changes in the shares of ag land owned by legal entities with at least 100 ha.

Oblast	Period 1 Δ (Sep 6, 21 - Oct 31, 22)	Period 2 Δ (Oct 31, 22 - Aug 14, 23)
Vinnytsia oblast	0.000517%	-0.082509%
Volyn oblast	-0.000077%	-0.000334%
Dnipropetrovsk oblast	0.000764%	0.003485%
Doetsk oblast	0.003356%	-0.001224%
Zhytomyr oblast	0.215466%	-0.073541%
Zakarpattia oblast	-0.000875%	-0.000902%
Zaporizhia oblast	0.031273%	-0.063262%
Ivano-Frankivsk oblast	0.082038%	-0.059464%
Kyiv oblast	0.067904%	-0.005957%
Kirovohrad oblast	0.000000%	0.000000%
Luhansk oblast	-0.000123%	-0.000484%
Lviv oblast	0.005223%	-0.000321%
Mykolayiv oblast	0.005411%	0.000818%
Odesa oblast	0.107015%	-0.028038%
Poltava oblast	0.002479%	0.000000%
Rivne oblast	0.000024%	-0.000513%
Sumy oblast	-0.000293%	-0.000092%
Ternopil oblast	-0.004760%	-0.004576%
Khrakiv oblast	-0.000629%	0.000000%
Kherson oblast	0.018550%	-0.057864%
Khmelnytsky oblast	0.012054%	0.000000%
Cherkasy oblast	-0.000890%	-0.000080%
Chernihiv oblast	0.000000%	0.000000%
Chernivtsi oblast	0.000000%	0.000000%

5. Conclusion and discussion

This study represents a follow-up to the series of analytical papers on the Ukrainian sales market (Kvartiuk & Martyn, 2021, 2022). The goal is to monitor the dynamics of land sales and to address

the most burning questions and debates about the sales market. In particular, we examined how the market has developed in the settings of the Russian war against Ukraine focusing on distress sales and land concentration. Moreover, we analyze the behavior of agricultural enterprises on the OSG-land market to obtain clues about their behavior in 2024, after the consequent liberalization of the sales market.

Generally, we find signs of the market recovery after the initial shock of the Russian invasion. Thus, the number of transactions in 2023 went up substantially in comparison to the 2022 level. Nevertheless, the turnover remains relatively low. Furthermore, we find signs of price discounts in the frontline regions. Importantly, if we found trends towards land concentration in 2022, in 2023 we observed both, individuals and legal entities to reduce their land holdings. Finally, agricultural enterprises appear to have higher willingness to pay for OSG-land which is likely to translate into the whole sales market in 2024 substantially stimulating it.

5.1 Data quality

Obtaining additional data on price reporting allowed us to reconstruct the timeline of how reporting was conducted. Unfortunately, because of the frequent changes in the price-recording rules, the prices in the land monitoring system are comparable only to a limited extent. Although price recording improved dramatically in 2023, the way it was achieved is not optimal as it limits comparability of the prices in 2021. Despite the improvements, we still find some missing values in the TCs of the Kyiv oblast with potentially very valuable land.

As pointed out in the previous APD Studies, stylized categories of buyers and sellers need to be published to effectively monitor the land sales market in Ukraine. Obtaining the data on buyers during the two-year functioning of the market has proven extremely useful (see Subsection 3.3.4). These data can help design evidence-based policies tailored to the Ukrainian land sales market.

5.2 Land prices

Additional data allowed us to investigate how the land prices have reacted to the Russian invasion and active fighting in some of the regions. In the majority of oblasts, nominal prices appear to be stable. However, in the oblasts where active fighting took place, we observe substantial price discounts. Although, with the stabilization of the military situation, prices appear to have recovered slightly. On the other hand, real sales prices have declined substantially from 1,100 USD per ha to ca. 950 USD per ha.

NMV remains a safeguard against distress sales and the markup above NMV appears to be still low. Thus, we find the sales price to be equal to the NMV in three-fourths of the sales transactions. Only a small share of transactions report a price that is substantially larger than NMV. We observe a slight increase in these transactions over time which may suggest that the market is becoming more competitive. Unfortunately, we still find 2.4% of transactions with sales prices below NMV. A closer inspection of the reasons behind should take place.

5.3 Willingness to pay by different entities

We addressed the uncertainties related to the 2024 inclusion of legal entities and raising of the ownership cap from 100 ha to 10,000 ha. In particular, we modeled and compared the behavior of the entities and individuals on the market for the OSG-land which has existed for decades. Importantly, hedonic pricing models show that agricultural enterprises pay 43.3% more for the same land plots than individuals. No statistically significant difference was found for the case of individual farms. This suggests that admission of the legal entities to the sales market will be associated with a substantial increase in demand which should translate into higher turnover volumes and higher prices. Of course, this will be conditional on whether enterprises will behave similarly on the market of the land for commercial agriculture.

5.4 Land concentration

We find that the fears of excessive land accumulation do not find support in the data analysis so far. Although we saw trends of slight land accumulation in the first year after the launch of the sales market, we observed a considerable reduction in land concentration in 2023. Although de-concentration is more pronounced among individuals, enterprises appear to have disposed of some land in 2023 as well. Despite these minor reductions, several oblasts are clear outlying leaders in terms of land concentration: Cherkasy and Odesa oblasts for individuals and Kyiv and Zhytomyr oblast for agricultural enterprises. Further investigation should be conducted on the reasons behind.

Addressing the debate about land collateralization, we identified five banks with land holdings over 100 ha of agricultural land and tracked what they were doing with their land during the period in question. We found that only two banks appear to actively work with the land for commercial agriculture whereas the other three may be using predominantly OSG-land as collateral because the market for OSG-land may have been more liquid. Banks appear to be able to dispose

of at least parts of their land holdings on the land market suggesting a certain degree of collateralizability of agricultural land.

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Appendix A. Classification of the use purposes of agricultural lands.

Code	Name	Subject to moratorium (yes/no)
01.01	For commercial agriculture	Yes
01.02	For farming enterprise	Yes[3]
01.03	For individual farming (OSG)	No[4]
01.04	For subsistence farming	No
01.05	For individual gardening	No
01.06	For collective gardening	No
01.07	For amateur gardening	No
01.08	For hayfields and pastures	Yes
01.09	For scientific and educational purposes	Yes
01.10	For propagating modern agriculture	Yes
01.11	For providing services in agriculture	No
01.12	For hosting bulk markets of agricultural produce	No
01.13	For other agricultural purposes	No
01.14	For preservation and use of lands of the nature reserve fund	No

[3] There was no direct ban on the alienation of land for farming enterprise, but notaries have historically interpreted the norm of Article 1 of the Law of Ukraine "On Farming", according to which "farming is a form of entrepreneurial activity of citizens who want to produce commercial agricultural products, process and sell them." Therefore, it was widely considered that these land plots are subject to a ban on alienation as land for commercial agricultural production.

[4] As a general rule, these land plots were not restricted in economic circulation, but if a land plot with such purpose was obtained by allocating a land share in the distribution of lands of a collective agricultural enterprise, then it was prohibited from alienation. Land plots up to 2 hectares of size provided through privatization free of charge (but not land shares) were in free circulation.

Appendix B. Price discount estimations

For all of our price estimations with Tobit models, we use the following specification based on the hedonic approach where characteristics of a land plot determine the price:

$$Price_i = \beta_1 War_i + \beta_2 NMV_i + \beta_3 Controls_i + u_i,$$

where $Price_i$ is a logarithm of the price per ha for a given land plot i. Among the explanatory variables, we include the dummy War_i for whether a transaction was before or after February 24, 2022; NMV_i reflects the attractiveness of a given land plot as it includes the soil quality and the expected return per ha. Among the control variables, we include area, area squared as well as oblast and months dummies depending on the model.

All the Tobit models with price estimations can be found in

Table 7. Tobit estimations of the nominal sales prices.

	(1) Whole country	(2) Affected oblasts	(3) Chernihiv	(4) Kharkiv	(5) Sumy	Zapo
War dummy	0.029***	-0.046***	-0.045**	-0.005	-0.139***	-0
	(0.000)	(0.000)	(0.033)	(0.685)	(0.000)	(0.
Area (ha)	-0.017***	-0.010***	0.072***	-0.016***	-0.015	-0
	(0.000)	(0.000)	(0.000)	(0.000)	(0.425)	(0.
Area squared	0.000	0.000*	-0.006***	0.001***	0.003	0.
	(0.188)	(0.062)	(0.001)	(0.001)	(0.213)	(0.
NMV per ha	0.000***	0.000***	0.000***	0.000***	0.000***	0.00
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.
Dummy for hayfields and pastures	-0.440***	-0.493***	-0.252***	-0.679***	-0.333***	-0.2
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.
Oblast dummies	Yes	Yes	Yes	Yes	Yes	Y
Constant	9.816***	9.307***	9.233***	9.464***	9.062***	9.16
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.
Observations	41802	12491	1998	4509	4697	7

*Significant at 0.1; **Significant at 0.05; ***Significant at 0.01. P-values are reported in brackets.

. We first present the models with the transactions from the whole country (model (1)). Then, we limit our sample to affected oblasts only (model (2)) and estimate the same specifications on the sub-samples of the affected oblasts (models (3)-(7)). Please, note that we exclude Luhanska, Donetska, and Khersonska oblasts as there were no or too few transactions for statistical inference. These estimations give us an idea about the exogenous effect of the war on land prices controlling for the factors that may affect land prices.

Table 7. Tobit estimations of the nominal sales prices.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Whole country	**Affected oblasts**	**Chernihiv**	**Kharkiv**	**Sumy**	**Zaporizhia**	**Mykolayiv**
War dummy	0.029***	-0.046***	-0.045**	-0.005	-0.139***	-0.008	0.079***
	(0.000)	(0.000)	(0.033)	(0.685)	(0.000)	(0.730)	(0.000)
Area (ha)	-0.017***	-0.010***	0.072***	-0.016***	-0.015	-0.009	-0.007
	(0.000)	(0.000)	(0.000)	(0.000)	(0.425)	(0.179)	(0.173)
Area squared	0.000	0.000*	-0.006***	0.001***	0.003	0.000	0.000
	(0.188)	(0.062)	(0.001)	(0.001)	(0.213)	(0.762)	(0.423)
NMV per ha	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy for hayfields and pastures	-0.440***	-0.493***	-0.252***	-0.679***	-0.333***	-0.219**	-0.678***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.027)	(0.000)
Oblast dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.816***	9.307***	9.233***	9.464***	9.062***	9.162***	9.595***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	41802	12491	1998	4509	4697	782	1287

*Significant at 0.1; **Significant at 0.05; ***Significant at 0.01. P-values are reported in brackets.