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Agro Policy Report

Ukraine's agricultural land rental market: Recent prices and monitoring challenges

Vasyl Kvartiuk, Andrii Martyn

Kyiv, August 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 focuses on political, legal, and technical issues related to land management and accompanies the current discussions in Ukraine concerning land market development.

APD Deutsch-Ukrainischer Agrarpolitischer Dialog

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ACRONYMS

Territorial community	TC
Cabinet of Ministers of Ukraine	CMU
Classification of the Types of Land Purposes	CTLP
Classification of the Land Types	CLT
Consumer price index	CPI
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

Since the launch of the agricultural land sales market on July 1, 2021, public attention has been directed towards the land sales market neglecting the land rental market – still the most common way of accessing agricultural land in Ukraine. With land sales turnover below 1% per year (Kvartiuk & Martyn, 2022), land rental remains the most effective way to adjust farm size. Land reforms during recent years were expected to contribute to more liquid and transparent rental as well as sales markets. Importantly, observers were predicting increases in both sales and rental prices after implementation of the liberal reforms (Deininger & Nivyevskyy, 2019; Kvartiuk & Herzfeld, 2019). However, these price increases may have been hampered by the Russian war against Ukraine that has been waged since February 24, 2022. To our knowledge, no systematic analysis of the trends in the rental markets of private and state-owned agricultural land has been conducted. We address this gap by examining the rental transaction volumes and rental prices spatially and temporally.

An important component of the land reforms is to effectively evaluate agricultural land value via increased transparency and interoperability of existing registries. Before the launch of the sales market, nominal monetary valuation (NMV) of land was serving as a reference value. NMV was used as a basis for land taxation, auctions for rental rights, etc. Because the gap between NMV and land market value may be large, new approaches to land valuation are being currently discussed (Deininger & Ali, 2023). In particular, the State Registry of Property Rights on Real Estate (SRPREE) with recorded land rental prices on a transaction level is supposed to serve as a basis for market-based land value calculation. Because SRPREE is likely to be an important data source for a new land valuation strategy, it is important to examine the quality of its data.

To accomplish these tasks, we use the data from SRPREE on land rental transactions and complement it with several statistics. The dataset covers the period of two and a half years: from November 2020 to March 2023. This allows us to examine the price developments before and after the two major events that may have affected Ukrainian land relations: the launch of the land sales market and the beginning of the Russian war against Ukraine. We look into the spatial and temporal distribution of the volumes of rental transactions and rental prices. In addition, we pay special attention to the proportion of the transactions with missing values which may directly affect the quality of the new land valuation strategy. The study provides insights into the land rental market dynamics and provides clear policy recommendations.

2. Institutional context

During the last two decades, a fairly developed land rental market has secured access to agricultural land for Ukrainian agricultural producers. The rental market for private agricultural land appears to be relatively liquid and competitive. Ukrainian legislation does not limit land owners and tenants in their negotiation over the terms of rental. The only important limitation is that the rental period cannot be less than 7 years and longer than 50 years. On the other hand, state-owned land can be accessed via transparent land auctions. Thus, despite the launch of the land sales market in 2021, land rental remains the main way of accessing agricultural land for farmers and agricultural enterprises.

The Ukrainian land rental market has recently experienced important transformation processes. First, with the launch of the agricultural land sales market on July 1, 2021, economists were predicting increases in rental prices (Deininger & Nivyevskyy, 2019; Kvartiuk & Herzfeld, 2019). More competitive land sales and rental markets were expected to introduce price signals limiting farming on extremely large areas. These processes, however, may have been inhibited by the shocks of the Russian war against Ukraine waged since February 23, 2022. No transactions were possible until late May 2022. Moreover, substantial areas of Luhansk, Donetsk, Zaporizhzhia, and Kherson oblast were occupied by the Russian regime, which made rental transactions on a substantial part of Ukraine impossible.

A number of important legislative initiatives were adopted that are expected to improve the valuation of land for fiscal purposes and create the necessary infrastructure for effective monitoring of land relations in Ukraine. First, the Law from May 2, 2023, 3065-IX "On introduction of changes to some laws of Ukraine on improving legal regulation of notary and registration procedures while obtaining rights for land plots" introduced pilot projects of mass land valuation. However, so far no concrete mechanism was introduced but the Cabinet of Ministers of Ukraine was mandated with the development of the valuation procedures within three months after adoption of the law. Second, the Cabinet of Ministers' of Ukraine (CMU's) Decree 474 from May 12, 2023 "On public monitoring of land relations" specified the mechanisms of the data exchange between nine executive state bodies that will collect, process, and publish key data on Ukrainian land relations. The goal is to create an automated monitoring system that will facilitate easy access to the monitoring results. Piloting of the system is scheduled for early 2024 and will represent a resource for evidence-based policymaking. Because rental prices recorded in the SRPREE will be the basis of the

valuation and monitoring procedures, it is essential to assess the quality of the available data and identify possible bottlenecks.

One of the central challenges of working with the data from SRPREE has been the availability of price records (Kvartiuk & Martyn, 2021, 2022). Addressing these challenges State Service for Geodesy, Cartography, and Cadaster (SGC) collaborated with the Ministry of Justice (MoJ) in July 2023 on improving the information exchange of data between the SRPREE and the SGC. These measures are expected to improve the reporting of land sales and rental prices. Although Nivyevskyy et al. (2023) report improved reporting of land sales prices, it remains to be seen if the SRPREE data improves the rates of land rental prices reporting.

3. Dynamics of land rental and prices

3.1 Transactions data description

This study is based on a transaction-level dataset from the SRPRE. We consider all rental transactions with agricultural land in the period between November 1, 2020, and March 31, 2023, which accounts for almost 2 million observations. Figure 1 demonstrates the distribution of the major types of land. Most of the rental transactions (ca. 69%) involved land plots for commercial

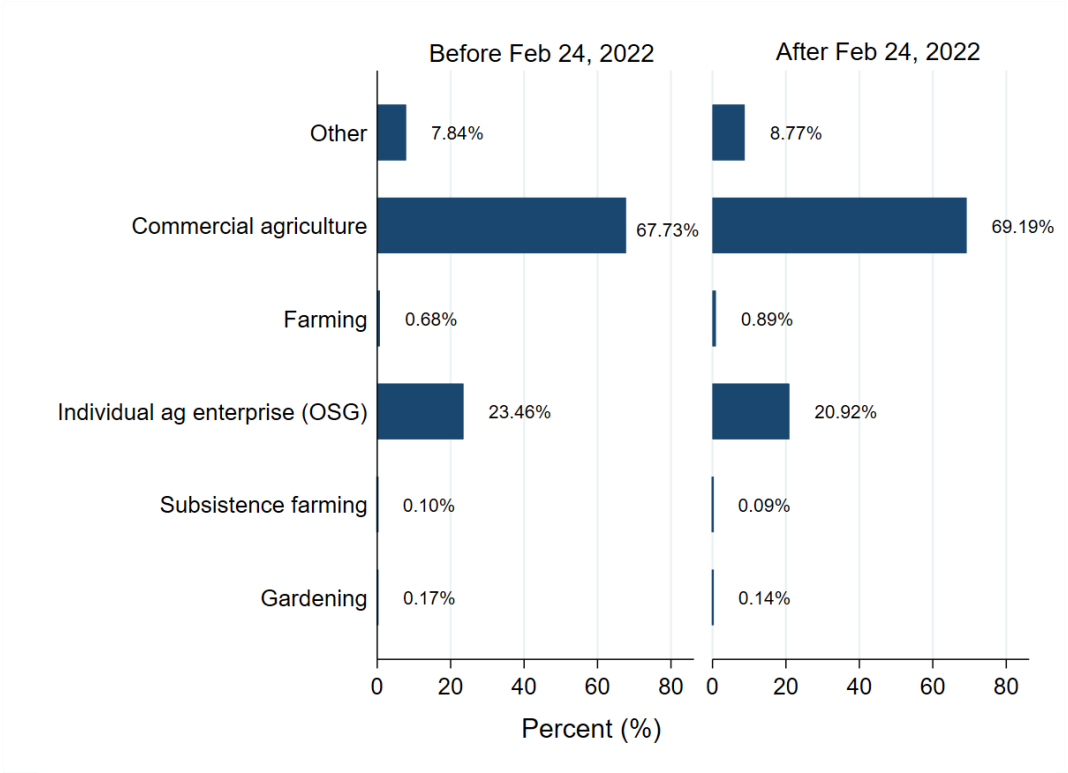

Figure 1. Distribution of transactions by major types of land.

agriculture according to the Classification of the Types of Land Purposes (CTLP). The second most numerous type of transactions is represented by the land for individual agricultural enterprises (OSG) accounting for 23.46% before the beginning of the Russian war against Ukraine and 20.92% after February 24, 2022. As these are two major land types in Ukrainian agriculture, we will focus on them throughout this study. Land plots for individual farming, gardening, and subsistence farming represent a minuscule number of land plots.

Figure 2 presents the temporal distribution of contracts by major land types. We see that before the war there had been between 50 and 70 thousand rental contracts per month for the land for commercial agriculture. For OSG-land respective figures are around 20 thousand contracts per month. Interestingly, the launch of the sales market does not appear to have affected the contract numbers of either of the land types. However, we observe a large drop in rental activity after the beginning of the Russian war against Ukraine. It took ca. three months of recovery to stabilize at around one-third of the pre-war activity. Figure 4 presents the dynamics of rental activity in terms

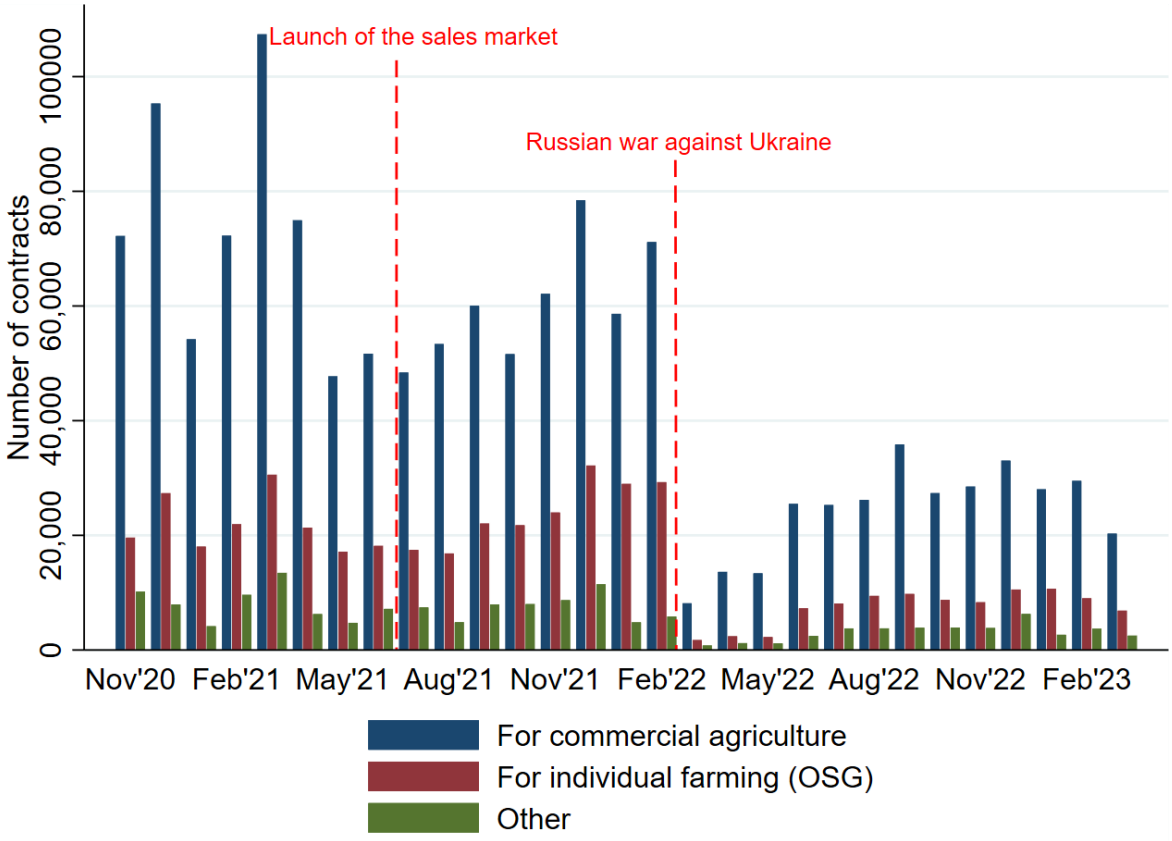

Figure 2. Temporal distribution of the number of rental contracts by type.

of transacted area which appears to be very close to the distribution of the number of contracts in Figure 2.

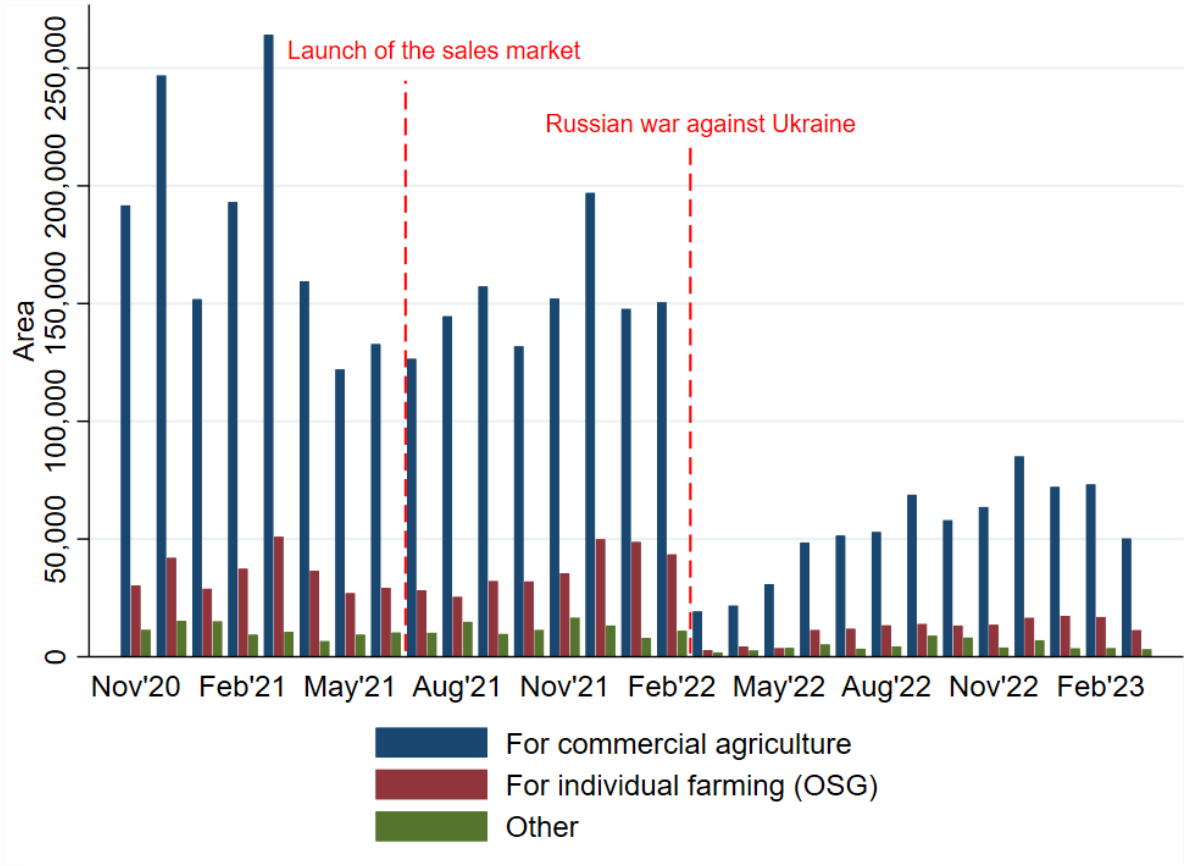

Figure 3. Temporal distribution of rented area by land type.

3.2 Missing values

Because one of the central challenges for rental market monitoring and land valuation is the availability of reliable data, it is essential to evaluate the data quality from SRPREE. Figure 4 presents monthly shares of non-missing price values for three major types of agricultural land: land for commercial agriculture, OSG land, and other types of agricultural land. We find only rarely the months when at least half of the price records are available. The typical share of non-missing price values for land for commercial agriculture ranges between 40% and 45%. Interestingly, we observe a steep decline in the non-missing values of the land for commercial agriculture

two months after the beginning of the Russian war against Ukraine.[1] No similar decline is identified for the other types of agricultural land. As a result, the prices for the vast majority of the rental contracts are not disclosed making the monitoring of the land rental market very difficult. Unfortunately, just until recently, the situation parallels the land sales market with similar rates of sales price reporting (Kvartiuk & Martyn, 2022).

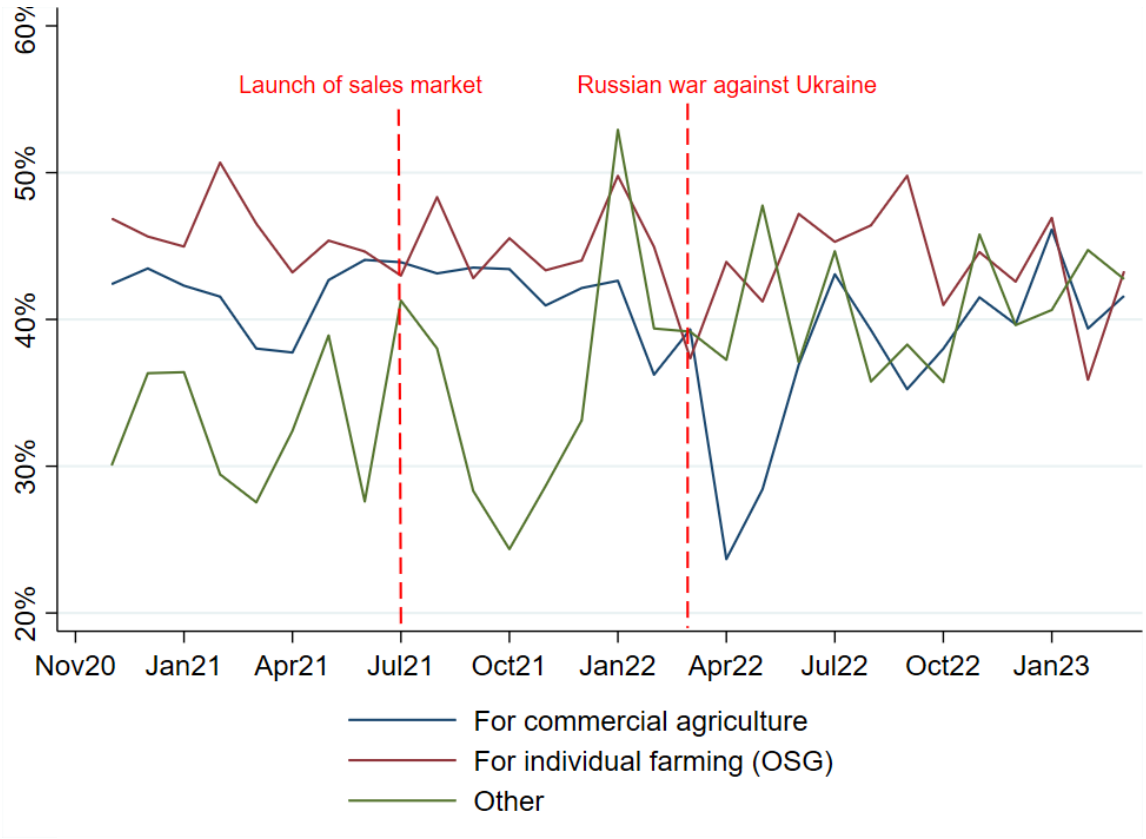

Figure 4. Monthly shares of non-missing rental prices in the SRPREE.

Some areas in Ukraine appear to be better at recording rental prices than others. Figure 5 presents a choropleth map with a spatial distribution of the shares of rental contracts for which price records are to be found in the SRPREE after February 24, 2022. An immediate observation is that the territorial communities (TCs) under occupation or in the close vicinity of active fighting did not have any rental transactions. Then, it is evident that TCs with low and high rates of price

[1] During March and April, land lease contracts for commercial agriculture were almost the only transactions that took place on the land lease market because, despite the temporary shutdown of the SRPREE, the ban on concluding such contracts was never introduced and they were not subject to registration by notaries. Registration of the rental rights during this period in SRPREE was possible after the relaunch of SRPREE in May 2022. Difficulties with registration procedures may have affected the number of missing values.

records are clustered. Thus, areas with low records could be taken as case studies to investigate the reasons behind this in more detail. For instance, notaries may be systematically omitting price records incentivized by local land users. Interestingly, we find a substantial number of TCs without a single price record. It is also easy to observe that Ternopil and Chernivtsi regions (highlighted with a red circle) have disproportionately low price-recording rates. TCs in other oblasts appear to be rather diverse in the rental price recording rates.

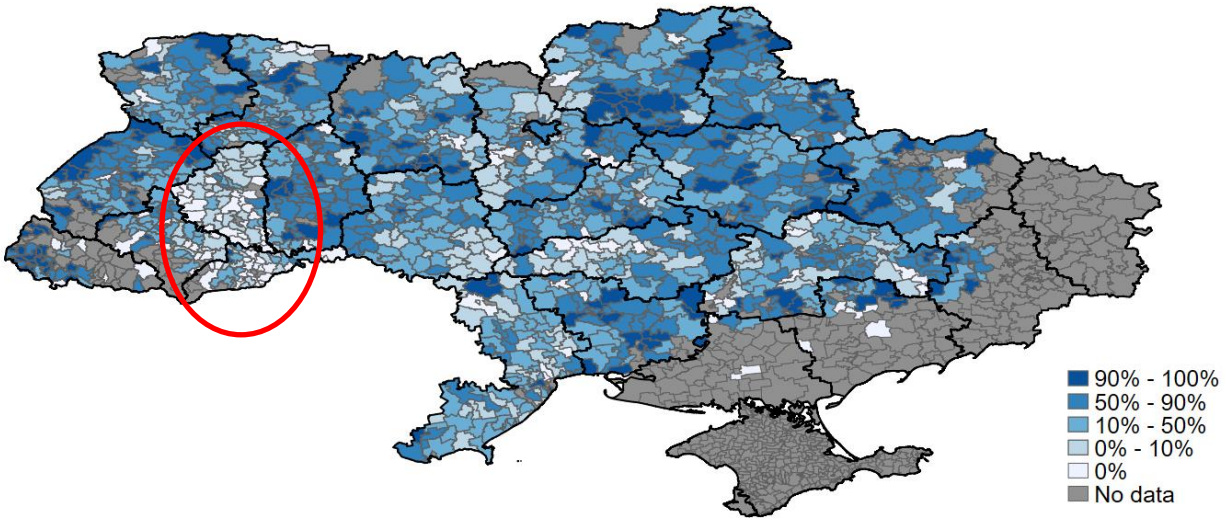

Figure 5. Spatial distribution of non-missing price values on the TC level.

On average, the share of non-missing price values improved slightly (by 6.72%) between 2020 and 2023. Table 1 presents the shares of non-missing price values by oblast and year. The top three oblasts that improved rental price reporting during the period of our interest are Kherson (by 48.67%), Donetsk (by 48.15%), and Mykolaiv (by 21.29%). The situation with reporting worsened the most in Chernivtsi (by 16.31%), Vynnytsia (by 12.11%), and Odesa (by 9.91%). If we consider the situation with reporting relative to the other oblasts, Ternopilsa, Ivano-Frankivska, and Chernivetska oblasts appear to be the worst performing. Consequently, a more detailed examination of the reasons behind low rental price reporting rates in these oblasts would be beneficial.

Table 1. Shares of missing price values by oblast and year.

Oblast	**2020**	**2021**	**2022**	**2023**	**Δ (2023 – 2020)**
Vinnytsia oblast	47.06%	43.34%	31.31%	34.95%	-12.11%
Volyn oblast	41.98%	38.69%	49.23%	42.24%	0.26%

Dnipropetrovsk oblast	31.77%	29.03%	28.44%	26.11%	-5.67%
Donetsk oblast	19.62%	26.71%	36.03%	67.77%	48.15%
Zhytomyr oblast	38.56%	41.61%	53.93%	51.06%	12.50%
Zakarpattia oblast	64.59%	72.80%	80.99%	84.23%	19.64%
Zaporizhia oblast	52.99%	47.02%	54.41%	52.36%	-0.63%
Ivano-Frankivsk oblast	24.50%	20.15%	8.86%	15.44%	-9.06%
Kyiv oblast	37.48%	40.89%	33.96%	42.56%	5.07%
Kirovograd oblast	38.01%	32.82%	34.71%	36.63%	-1.37%
Luhansk oblast	64.92%	63.16%	66.65%	No data	No data
Lviv oblast	65.60%	52.72%	63.77%	66.18%	0.57%
Mykolaiv oblast	47.36%	54.00%	50.51%	68.65%	21.29%
Odesa oblast	36.50%	22.05%	24.65%	26.59%	-9.91%
Poltava oblast	53.69%	56.52%	61.49%	61.32%	7.63%
Rivne oblast	39.25%	46.56%	51.40%	42.61%	3.36%
Sumy oblast	48.82%	55.38%	57.93%	63.02%	14.20%
Ternopil oblast	10.57%	3.97%	6.33%	8.57%	-2.00%
Kharkiv oblast	58.55%	54.46%	41.06%	57.80%	-0.75%
Kherson oblast	16.04%	19.32%	19.31%	64.71%	48.67%
Khmelnytsky oblast	59.14%	55.25%	54.65%	49.45%	-9.69%
Cherkasy oblast	36.06%	40.29%	46.91%	45.11%	9.05%
Chernivtsi oblast	31.25%	17.30%	14.84%	14.94%	-16.31%
Chernihiv oblast	37.41%	45.77%	49.82%	56.21%	18.80%
Kyiv city	62.96%	47.70%	94.36%	82.43%	19.47%
Average	42.59%	41.10%	44.62%	48.37%	6.72%

In sum, the absence of rental price values represents a large challenge for land market monitoring and land valuation. Omitting recording rental prices may be intentional and cannot be attributed to technical difficulties because, for instance, the area of land plots is recorded 100% of the time. The same is the case for other essential plot characteristics. Reporting rental prices for each transaction must be made obligatory similar to reporting land sales prices.

3.3 Spatial distribution of transactions

Observing the choropleth map of Ukrainian TCs where at least one rental transaction took place, one can clearly see where the approximate 2023 frontline is (Figure 6). Nevertheless, we find three TCs on the territories continuously occupied after February 24, 2022, where a total of seven transactions took place. Five plots for commercial agriculture designated as forests by the Classification of the Land Types (CLT) were rented out in Zaporizhia oblast: in Chkalovska (4 plots) and Tokmatska (one plot) TCs. Two more plots for commercial agriculture designated as arable

land by the CLT were rented out in Zelenopidska TC, Kherson oblast. Technically, registration of the rental agreements should be impossible on the occupied territories. However, informants in the SGC suggested that since it's not the territories were excluded but the registrars that worked on occupied territories, it still should be possible to register transactions on the occupied territories. Otherwise, we observe rental transactions almost in every TC except for mountainous areas in the Carpathians and northern regions close to the borders with Russian and Belarus.

We observe a substantial variation in the number of transactions per TCs across Ukraine. As expected, we find clusters of high rental activity in Poltava, Cherkasy, and Kirovohrad oblasts but Vynnytsia and Lviv oblasts demonstrate high numbers of rental contracts as well. It may be worth pointing out a cluster of small TCs in Ivano-Frankivsk oblast with very high rental activity. This may be related to the fact that with the launch of the agricultural land market on July 1, 2021, the long-term ban on changing the purpose of commercial agricultural land for construction and other types of development was also canceled. Naturally, agricultural land near large cities, recreation centers (for example, ski resorts) may be of much greater non-agricultural interest.

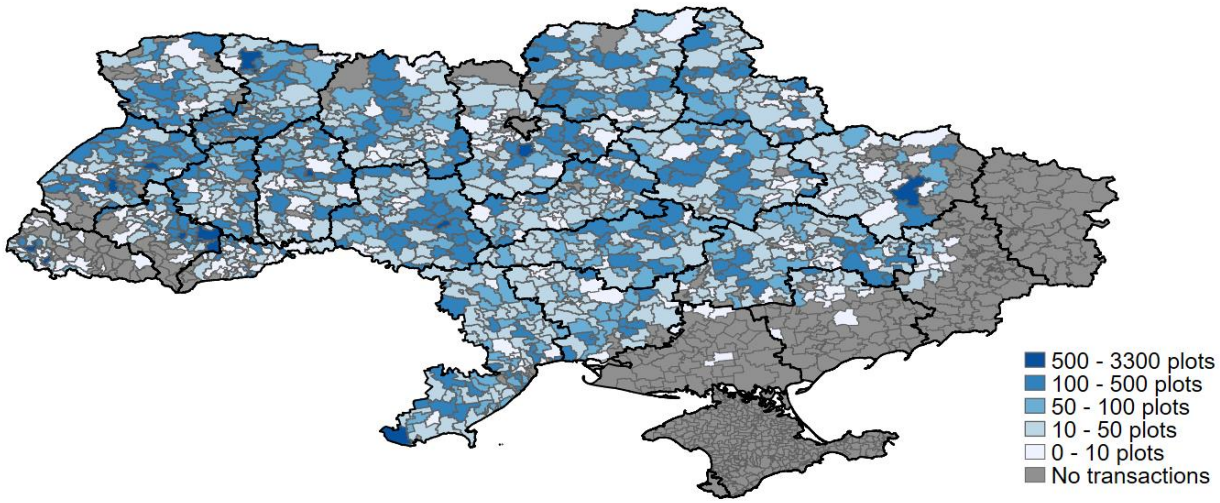

Figure 6. Spatial distribution of rental transactions for OSG-land and land for commercial agriculture after February 24, 2022.

Considering the fact that agricultural land plots are on average larger in Eastern Ukraine, most of the rented areas tend to be clustered around the central and eastern parts (Figure 7). Thus, Western oblasts do not demonstrate large rented areas despite the high number of transactions. After the war started, the largest areas were rented out in Kirovohrad, Poltava, and Dnipropetrovsk oblasts. Interestingly, we notice a similar cluster of darker blue color in the ski resort area

of Ivano-Frankivsk oblast. We see that despite the fact that land plots tend to be smaller in that area, large areas were rented out indicating very high rental activity.

Since the beginning of the Russian war against Ukraine, a total of 681,018.6 ha of the OSG land and land for commercial agriculture was transacted. This turnover corresponds to ca. 1.63% of the total agricultural area per year after the start of the war. This is roughly three times lower than before the war. In times of high uncertainty, it is essential that farms have a possibility to adjust their utilized land. In case of rigidities, misallocation of land may lead to lower aggregate production efficiency and, as a result, lower yields (Besley & Ghatak, 2009).

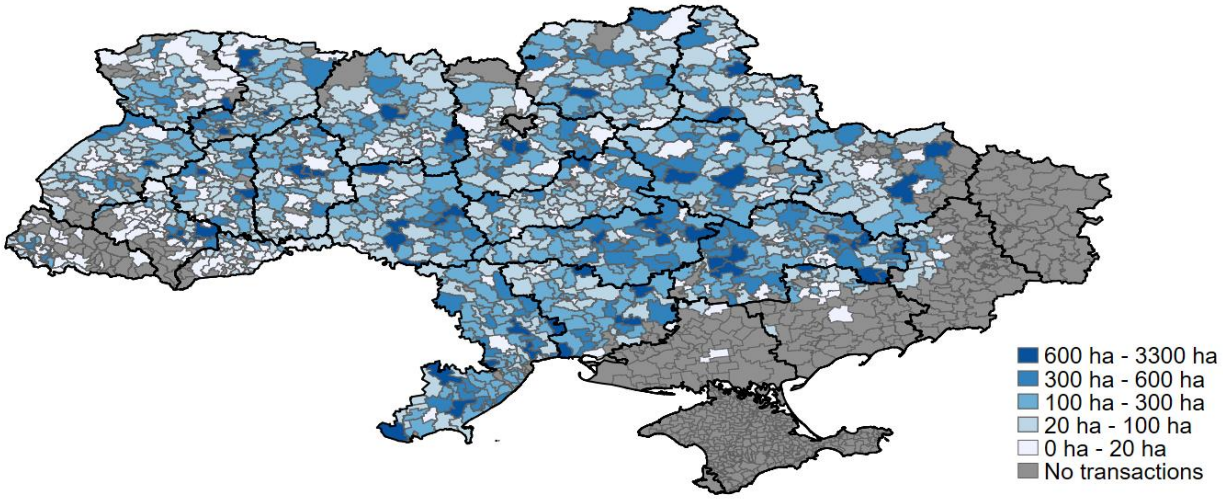

Figure 7. Spatial distribution of area rented for OSG-land and land for commercial agriculture after February 24, 2022.

3.4 Land rental prices

Before proceeding to the discussion about land prices, it is important to meaningfully restrict our sample to ensure comparability. First, we consider only arable land. Second, we focus on two major types of agricultural land: land for commercial agriculture and OSG land. Third, we deal with obvious outliers following Tukey's (1977) approach. In particular, we exclude all the observations above or below the interdecile range multiplied by the factor of 1.5. This is a less restrictive approach than the interquartile range utilized by Tukey (1977) meaning that we only deal with obvious outliers. Finally, we calculate real rental prices based on the Consumer Price Index

(CPI) data provided by the World Bank. We use the prices of November 2020 as a base for calculating monthly deflators.

Figure 8 presents the development of nominal (solid lines) and real (dashed lines) rental prices for land for commercial agriculture and OSG land. Our first observation is that rental prices for both types of agricultural land were in the range of 2,500-2,600 UAH per ha before the launch of the sales market. After the partial opening of the land market, nominal prices went up to 3,000 UAH per ha. Although we cannot establish a statistically causal relationship, these trends are in line with the observers' expectations (Deininger & Nivyevskyy, 2019; Kvartiuk & Herzfeld, 2019). Afterwards, we observe a period of large volatility and after July 2022 nominal prices stabilize around 3,000-3,500 UAH per ha.[2] However, real rental prices demonstrate a clear decreasing

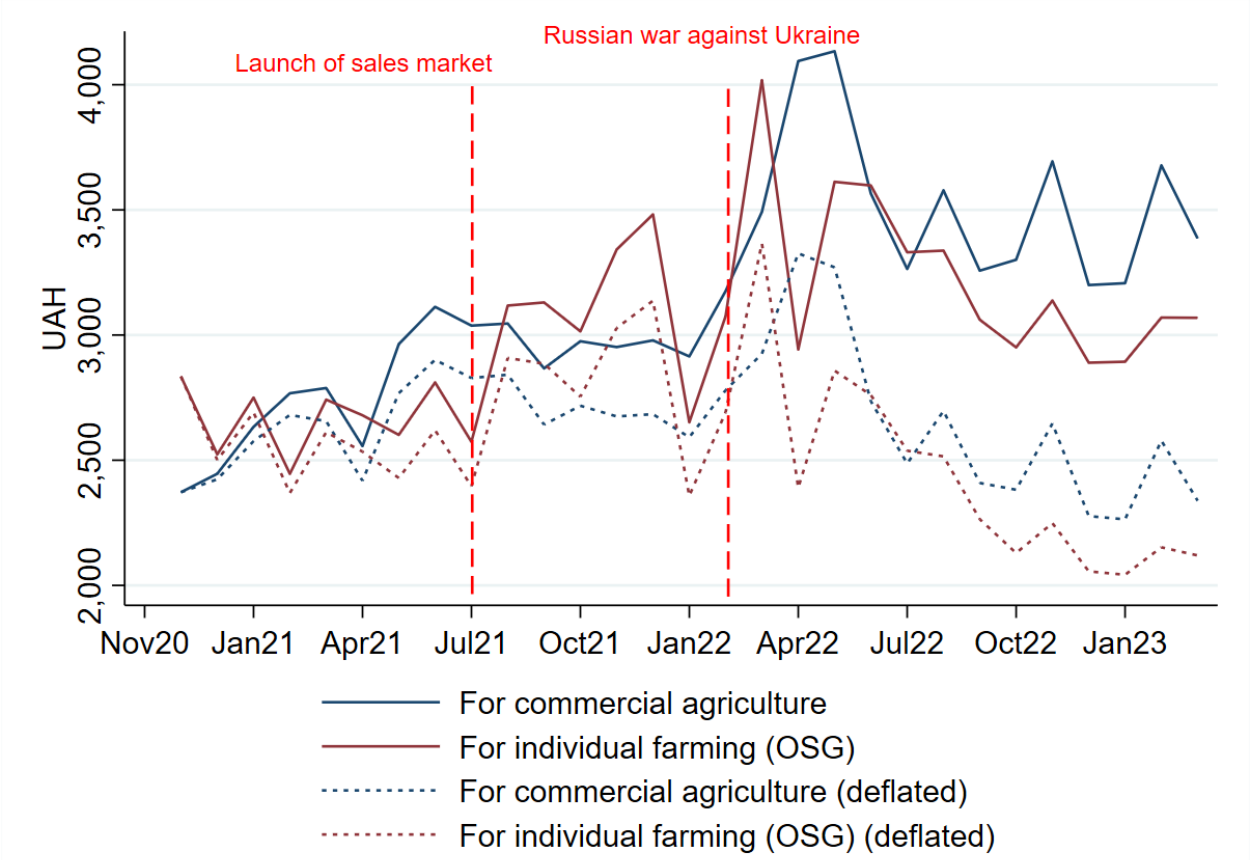

Figure 8. Nominal and real rental prices for two major types of agricultural land.

[2] Although, we observe a peak in nominal prices for commercial agricultural land in the first months after the war started, we should treat it with caution. Figure 2 and Figure 3 show that very few transactions took place during these months. Moreover, the share of non-missing price observations went down to ca. 24% in April 2022. As a result, we observe extra price volatility during the first months after the beginning of the war.

trend after the beginning of the war and go below the values of November 2020 in real terms. Thus, inflationary pressures substantially reduce rental prices even though nominal values appear to be stable after the beginning of the Russian war against Ukraine.

The spatial distribution of rental prices for arable land for commercial agriculture after the beginning of the Russian war against Ukraine is presented in Figure 9. The figure depicts average rental prices if at least one transaction took place and at least one transaction had a price record in the SRPREE. First, it is important to point out that the TCs marked with sandy color do not have a single price record. We see that the situation with reporting is dramatic in Ternopil and Chernivtsi oblasts. However, TCs in the western part of Kyiv oblast as well as the eastern part of Dnipropetrovsk oblast also demonstrate zero price records after the beginning of the war. The pattern of clustering of missing rental price records suggests that prices are not reported in certain areas systematically. These circumstances, once again, confirm the necessity to impose obligatory price reporting.

Higher prices in Figure 9 appear to coincide with intensive agricultural production areas. In particular, we observe the belt of high prices stretching from Sumy all the way to Lviv oblast. The highest rental prices appear to be recorded in Poltava, Cherkasy, and Vinnytsia oblasts. Here we observe at least half of TCs with average prices above 4,000 UAH per ha. As we move away from this "higher-prices belt" either to the North or South, we observe reductions in average rental prices. These reductions could be explained by climatic conditions for agricultural production as well as by the risks associated with the Russian war against Ukraine.

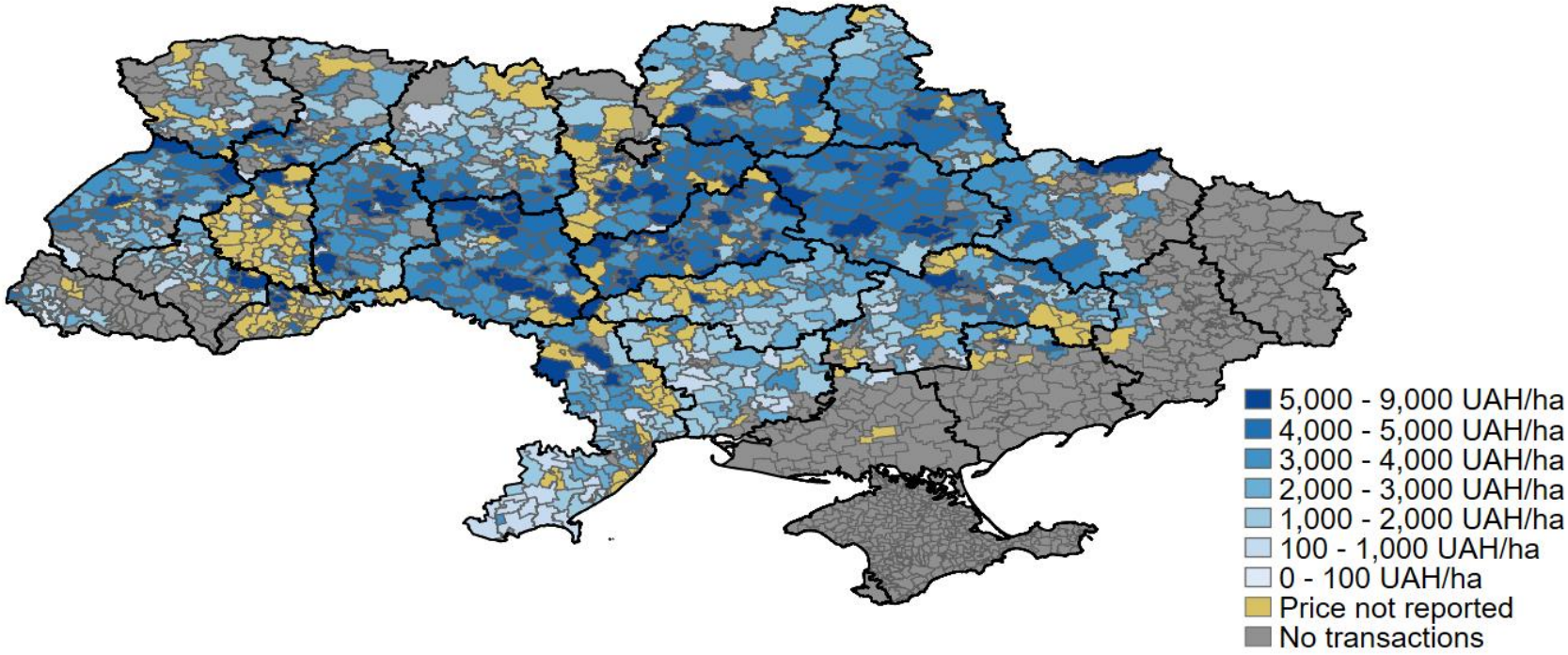

Figure 9. Average rental prices for arable land for commercial agriculture in the TCs after February 24, 2022.

3.5 Rental prices and major events

To estimate the effect of the launch of the land sales market and the war on land rental prices, we set up hedonic pricing models (Palmquist, 2005; Rosen, 1974). In particular, we explain real and nominal rental prices for two major types of land using the following hedonic pricing model:

$$P_i = \beta_0 + \beta_1 Ref_i + \beta_2 War_i + \beta_3 X_i + \varepsilon_i$$

where P_i represents a rental price of a plot i. Ref_i and War_i are dummies for the launch of the land sales market and the beginning of the Russian war against Ukraine, respectively. Finally, X_i is a vector of controls related to the plots' characteristics. To control for the plots' attractiveness, we use an average NMV on the TC level. This is the second-best approach because we do not have access to the plot-level NMV data. In addition, we include the share of non-missing values on the TC level to control for the possibility that the prices could be misrepresented in the areas where they are not reported often. We run Tobit regression for OSG- and commercial land prices and we distinguish between nominal and real prices.

Table 2 presents our estimations. The first observation is that our dummy variables are significant. The coefficient of the reform dummy is positive and significant throughout the specifications suggesting that the rental prices increased after the launch of the land sales market on July 1, 2021. The effect is particularly large for the land for commercial agriculture. The war dummy appears to be negative and significant for the specifications with the prices for commercial agricultural land and the real prices for the OSG land suggesting that the war pushed the prices down. Among the control variables, it is important to point out that the prices are predicted by the average TC-level NMV for both types of land. Additionally, we find that smaller land plots are on average more expensive with all other factors equal. This is in line with the literature on the small parcel size premium (e.g., Brorsen et al., 2015).

Table 2. Estimations of the rental prices for OSG-land and commercial land.

	(1) Deflated rental price for commercial land	(2) Nominal rental price for commercial land	(3) Deflated rental price for OSG-land	(4) Nominal rental price for OSG-land
NMV	0.010***	0.011***	0.003**	0.003**
	(0.000)	(0.000)	(0.019)	(0.045)
War dummy	-1809.259***	-1091.955*	-513.396*	154.089
	(0.000)	(0.099)	(0.087)	(0.690)
Reform dummy	2074.515***	2563.351***	441.747***	691.621***
	(0.000)	(0.000)	(0.001)	(0.000)

Area	-350.805***	-391.441***	-101.138***	-115.426***
	(0.000)	(0.000)	(0.000)	(0.000)
Share of non-missing price values by TC	768.812	1012.460	455.911**	520.147*
	(0.231)	(0.235)	(0.042)	(0.051)
Constant	2150.920***	1915.459**	2421.044***	2459.633***
	(0.002)	(0.038)	(0.000)	(0.000)
Oblast dummies	Yes	Yes	Yes	Yes
Observations	192,418	192,418	65,360	65,360

Note: *Significant at 10%-level; **Significant at 5%-level; ***Significant at 1%- level. Please, note that p-values are reported in brackets. Oblast dummies are included in each specification but are not reported due to space limitations.

4. Conclusion and discussion

This study represents a unique analysis of the evolution of the Ukrainian land rental market in the last three years. Because everyone's attention has been attracted by the launch of the sales market for agricultural land, the main way to access agricultural land in Ukraine has been somewhat out of public attention. We address this gap and highlight the temporal and spatial dynamics of rental transactions in the last three years (our sample includes all transactions from November 2020 till March 2023) and pay special attention to the rental prices for different types of agricultural land. One of the focuses of the study is to examine how rental prices changed after the launch of the sales market and the beginning of the Russian war against Ukraine.

In light of the ongoing land reforms, it is imperative to examine the quality of data of the key registries. SRPREE is a key registry where all the land transactions are recorded, and which provides the basis for new approaches to land valuation and land markets monitoring. In particular, we evaluate the situation with the availability of missing values of the rental prices in SRPREE and discuss the implications.

4.1. Data quality

We find that the general quality of the SRPREE data on land rental transactions is unsatisfactory for the time period from November 2020 up until March 2023. The main reason for that is the amount of missing rental price records. Although we observe 100% of the area records, the share of recorded price values ranges from 40% to 45% depending on the time. Thus, the majority of rental price records is not reflected in SRPREE. Moreover, we find that reporting strongly depends on the location of land plots. In particular, Ternopil and Chernivtsi oblasts appear to report rental prices only in 6.33% and 14.84% of all the transactions, respectively. These data obviously cannot generate any reliable understanding of the rental land markets in these oblasts.

Another challenge is the availability of data on NMV in SRPREE. Because NMV is not published in SRPREE, we face challenges in analyzing the general price dynamics. NMV has been the key information about land attractiveness during the last year and it is essential to report it in SRPREE.

In general, to achieve a high-quality land monitoring system as declared in the CMU Decree 474, all involved executive bodies should adopt a mentality change towards more transparency. More data must be systematically disclosed to allow high-quality analytics which would enable evidence-based political decision-making.

4.2. Type of land in SRPREE and rental volumes

Observing the volumes of rental transactions by purpose (following CTLP), we find that non-agricultural land accounted for less than 10% of all rental transactions. The vast majority of transacted land was for commercial agriculture (ca.68%) and OSG-land (ca. 22%). The rest was designated for individual and subsistence farming as well as for gardening. The distribution of land use purposes of the rented land did not change substantially after the beginning of the Russian war against Ukraine.

The war appears to have affected the volumes of rental transactions dramatically. Before the war, we observed 50-70 thousand monthly transactions for the land for commercial agriculture. This figure dropped to ca. 20 thousand rental contracts per month. A similar situation is observed for other types of agricultural land and for the areas transacted.

4.3. Land rental prices

First, we find that the launch of the land sales market represented a catalyst for the rental price increases. In particular, average nominal prices for the land for commercial agriculture and OSG-land went up from 2,500-2,600 UAH per ha before July 1, 2021, to ca. 3,000 UAH per ha. Importantly, real rental prices (inflation-adjusted) were growing during this period as well. These increases are probably associated with the development of the land sales market which was expected to introduce a more market-based price formation. Second, the war introduced a period of volatility right after its beginning that is followed by the stabilization of nominal prices around 3,000-3,500 UAH. However, real prices appear to have declined substantially after the beginning of the war.

Spatially, higher rental prices appear to be distributed along the belt with intensive agricultural production. In particular, we find relatively high prices in Poltava, Cherkasy, Vinnytsia, and Khmelnytsk oblasts. In addition, the southern part of Kyiv oblast demonstrates high rental prices as well. Regions to the north and south of the "high rental prices belt" demonstrate substantially lower rental prices.

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