



INFORMATION BASE AND ANALYTICS OF THE REAL ESTATE MARKET OF UKRAINE

December 2023



Bona consulta homini optima est!
Good advice is the best!

INTRODUCTION

The lack of a reliable analytical database of the purchase and sale of residential, commercial and industrial properties remains one of the biggest obstacles in obtaining reliable data on its real value.

This considerably complicates the process of carrying out a valuation, requires considerable effort from the expert to find market analogues of the sale, and reduces the accuracy and reliability of the results of such work.

The specified problem is quite significant for appraisers and their customers. It does not require detailed explanations, but requires appropriate efforts for its gradual solution.

VERITEX group forms the information and analytical base of the real estate market of Ukraine, using the appropriate automated and calculation products, application program packages. This makes it possible to effectively use such a database, to obtain generalized results in a planned manner, to formulate the patterns of the modern real estate market, as well as to forecast its priority directions for further development.

The creation of the primary electronic database is carried out by monitoring and accumulating information flows from the existing real estate market and their subsequent in-depth processing. All this becomes possible through the use of methods of mathematical and statistical analysis, geospatial and cluster analysis, machine learning and modeling, in particular neural networks and combinations of these methods.

The use of modern methods of database management (PostgreSQL), geographic information systems (QGIS) and a script library (Python) allows this initial analysis to be carried out as efficiently as possible.

The main principles, on the basis of which the information and analytical base is built, are:

- maximum coverage of the existing primary information base of the real estate market of Ukraine;
- application of accurate mathematical, statistical and other most suitable modern models and criteria for the analysis of large information arrays at all stages of primary database processing;
- conducting a full probabilistic and statistical analysis of the primary information base for all categories of real estate with obtaining the main parameters of their market state and development evolution;
- constant checking of intermediate and final results for compliance within the framework of the applied analytical model;

- constant comparison of the developed analytical apparatus and the obtained results with the most famous and recognized domestic and foreign works of this direction.

The introduction of these principles ensures high reliability and credibility of the obtained results and the conclusions formulated on their basis.

This all corresponds to the main goal, aimed at creating and providing all interested organizations and specialists with reliable analytics of the state, trends and forecast of the development of the real estate market with a detailed analysis of the impact of the main pricing factors.

INITIAL INFORMATION BASE AND ITS PRIMARY PROCESSING

Obtaining the initial information base and its primary processing form the basis of the following analysis of the real estate market and directly affect the results of the entire analysis. Therefore, considerable attention is paid to this initial and rather difficult stage of work.

According to its structure, the initial information and analytical database of the residential real estate market consists of the following blocks:

UNIT OF APARTMENTS: primary and secondary market;

UNIT OF LAND PLOTS: development, agricultural, industrial purposes;

UNIT OF HOUSEHOLDS: separated from land plots and together with them.

The processing of arrays of primary data for all three specified blocks of real estate is carried out on a single methodological basis using the analytical tools mentioned above. This ensures the unification of the methodology itself and the possibility of conducting a comparative analysis of the results for individual real estate groups.

1. INFORMATION AND ANALYTICAL UNIT OF THE APARTMENT MARKET

As of the end of December 2023, the database, in particular, the volume of the secondary apartment market includes about 764,545 unique offers from all over Ukraine. The majority of this market structure (>90%) is made up of 1-2-3-room apartments. The share of these apartments in terms of value is also major.

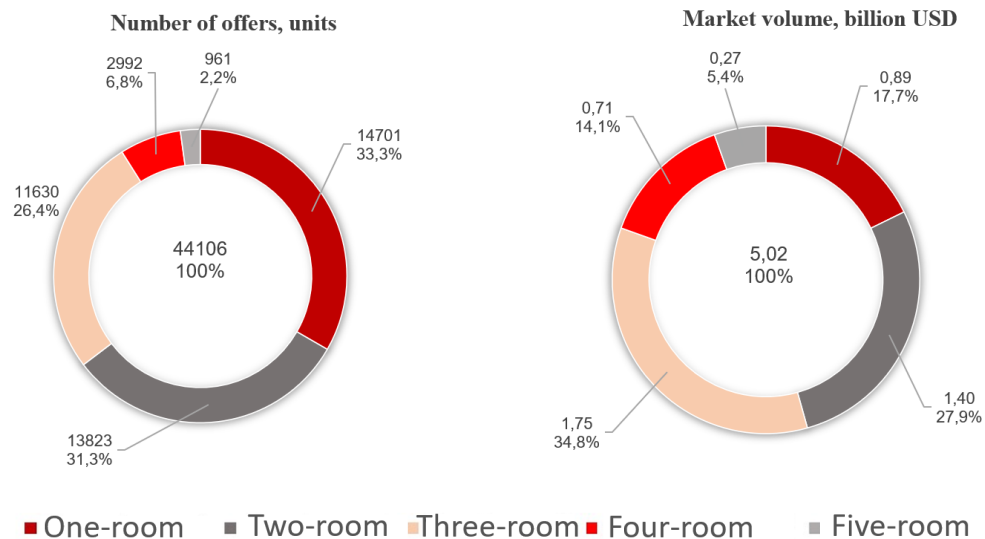


Fig. 1.1. Volume of the secondary apartment market in Ukraine as of December 2023

The total number of existing offers for sale in the fourth quarter of 2023 amounted to 44,106 apartments (Fig. 1.1). The largest share of offers for sale falls on one- and two-bedroom apartments, which accounted for 33.3% and 31.3% of the total number of apartments offered for sale, respectively. For three-room apartments, this share is also significant, reaching 26.4%. For 4-, 5- and more-room apartments, respectively, 9% of the total number of offers remains.

In monetary terms, the volume of the secondary apartment market in Ukraine in December exceeded \$5 billion (Fig. 1.1). The largest share belongs to two- and three-room apartments, with 27.9% and 34.8%, respectively, while one-bedroom apartments constitute 17.7%. The share of 4-room apartments in monetary terms is already 14.1%, and for 5-room and more, it is 5.4%.

This picture is quite natural as it reflects the structure of the housing stock, the construction of which has historically evolved over the last decades. The statistical regularities in the distribution of key characteristics and parameters of these distributions are crucial for property valuation, allowing for a comprehensive probabilistic and statistical analysis. The importance of

obtaining such distribution parameters is determined by the nature of the data, which has a probabilistic basis.

The indicators of the volume of the secondary market in Ukraine for the year 2023, presented in dynamics, provide an overview of the overall situation, taking into account the influence of various factors that either restrained or stimulated market activity (Fig. 1.2, 1.3). We observe that the overall trend throughout the year is downward. It is evident that the full-scale war, which continues to negatively impact the real estate market, is the main cause of the general contraction.

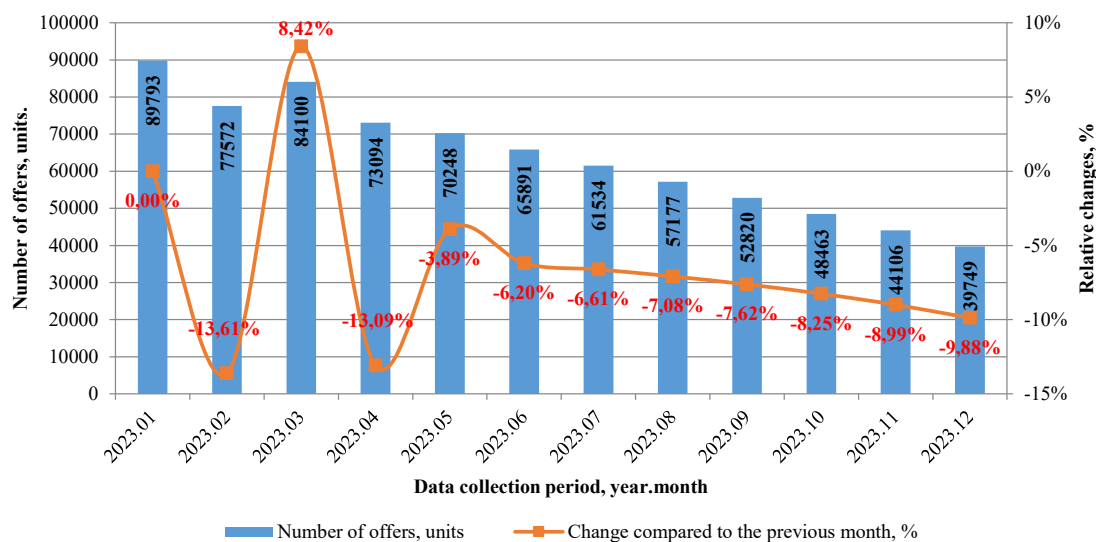


Fig. 1.2. Dynamics of the number of offers on the secondary apartment market in Ukraine, 2023

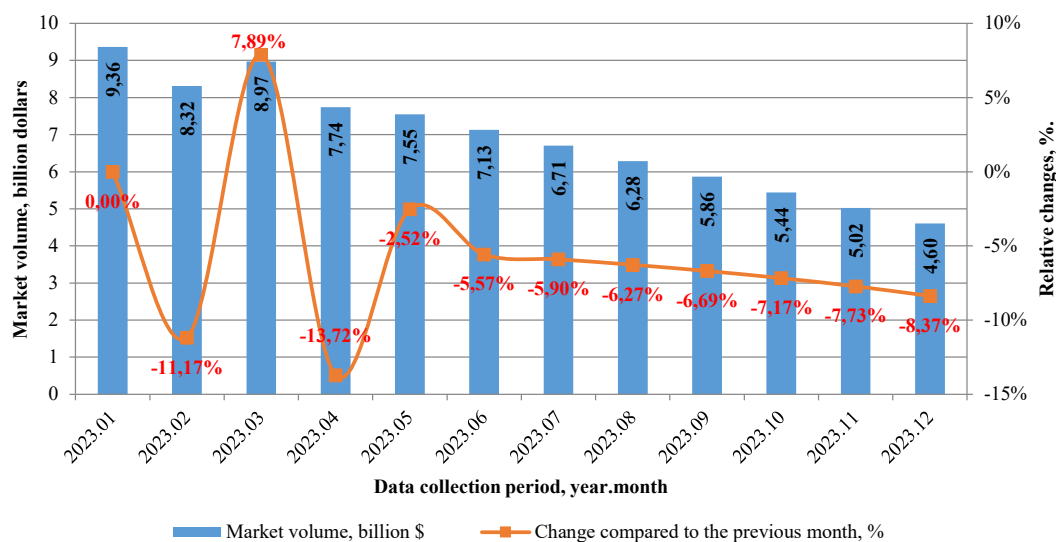


Fig. 1.3. Dynamics of the volume of the secondary apartment market in Ukraine in 2023, billion \$

Statistical analysis of the total amount of available primary information after its initial filtering based on the Romanovsky criterion for statistical "outliers" shows that the distribution density of one of the main and widely used monetary criteria - the cost per square meter of area - is not symmetrical and has a pronounced positive (right-sided) asymmetry (Fig. 1.4).

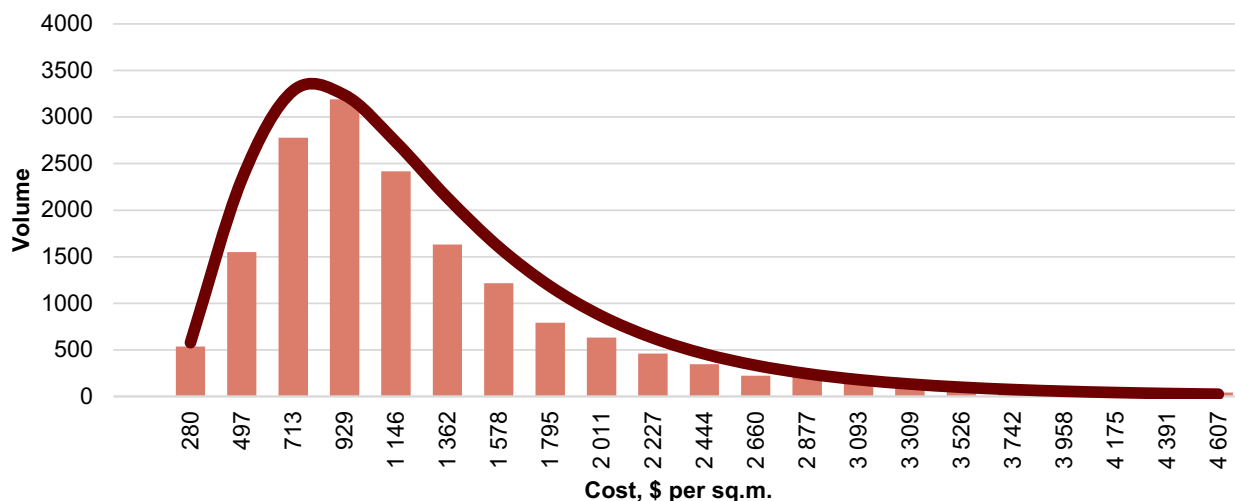


Fig. 1.4. Density of distribution of the cost of 1 sq. m. of apartments in the secondary market of Ukraine as of December 2023.

The analysis shows that all distributions of statistical data for certain time periods and geographical regions of this key financial parameter, which is widely used in the valuation of residential and industrial premises, share a similar overall pattern.

Based on this, we repeatedly assessed the consistency of the distributions or their "agreement" with the most well-known theoretical distributions. Such a check was carried out using one of the most statistically powerful criteria - Pearson's χ^2 criterion. Repeated calculations allowed us to conclude that the closest theoretical distribution to the obtained statistical samples is the logarithmically normal distribution of the parameter of the cost of 1 square meter of living space.

This general conclusion is undoubtedly important, as it allows us to estimate the parameters of the closest theoretical distribution from a statistical sample, and therefore to determine with the highest reliability the statistical characteristics of the key financial indicator of value, which is 1 square meter of the analyzed premises.

Since the analysis was carried out primarily for the overall most representative statistical sample throughout Ukraine, we can conclude that this distribution law is most consistent with the theoretical one for the specified monetary parameter - the cost of 1 sq. m. of apartments in US dollars.

Below are the density distributions of the cost per square meter of apartments in the secondary market offerings across Ukraine as a whole and in the largest cities (Kyiv, Odessa, Kharkiv, Dnipro, Lviv) as of December 2023, when approximated by a lognormal distribution law (Fig. 1.5, 1.6). Based on the nature of the distribution and for the convenience of processing real estate market statistics, the sample was logarithmized by the decimal logarithm. The values of the cost per square meter were obtained by the inverse logarithm method applied to aggregated values of the obtained statistical indicators.

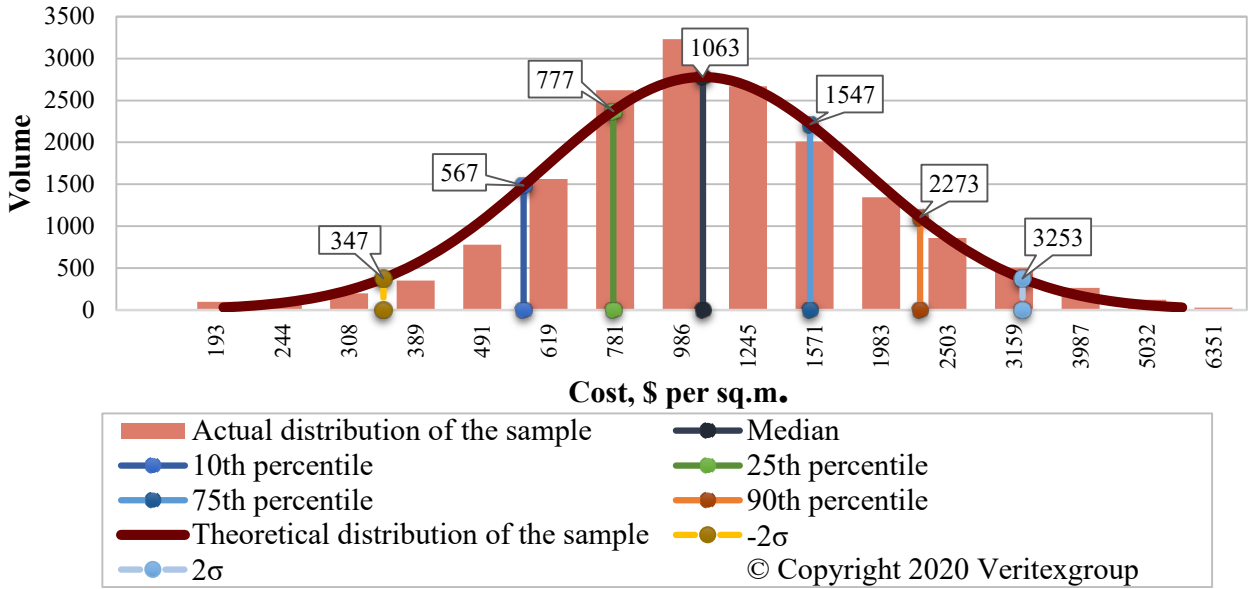
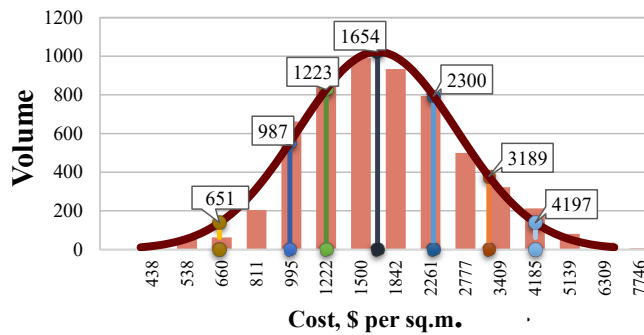


Fig. 1.5. Description of the density of distribution of the cost of 1 sq. m. of apartments in the secondary market of Ukraine as of December 2023 by the log-normal distribution law

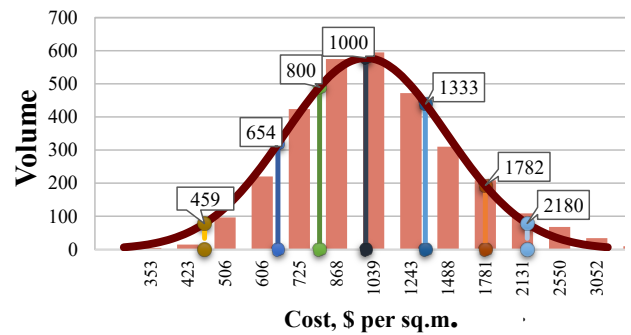
Thus, based on the obtained results, we can justify the application of such an approach. Therefore, all further processing of the primary information database is based on determining the parameters of the log-normal distribution law adopted as the theoretical law for the entire general population of the information database on the distribution of the cost per square meter of living space.

The median values of apartment costs in Kyiv, Odessa, Kharkiv, Dnipro, and Lviv on the secondary market in December 2023 were \$1654/sq.m., \$1000/sqm, \$809/sq.m., \$929/sq.m., and \$1490/sq.m., respectively. In general, this indicator for the country is 1063 \$/sq.m. Thus, significant differences can be observed in both the levels of average cost for different regions and the degree of their volatility (Table 1.1, Fig. 1.6). At the same time, obtaining only averaged cost indicators for each individual city is not sufficient, considering the geographic zoning and differentiation of cost indicators within the city.

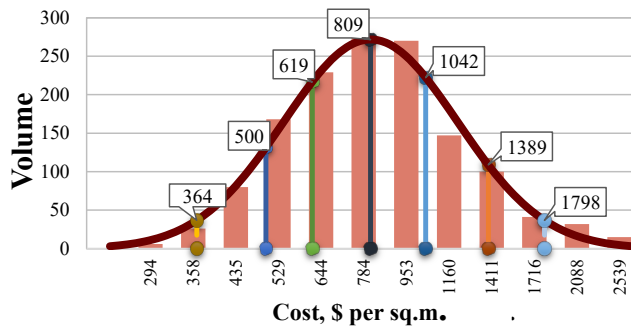
The summary table of distribution parameters for this indicator, including all regional centers without exception, includes not only the mean and median values but also the level of their dispersion and variation, providing a complete description of the probabilistic and statistical parameters of these distributions (Table 1). In particular, this table provides data for values "mean plus and minus 2σ ," corresponding to the limits of 95.46% of the corresponding distribution.



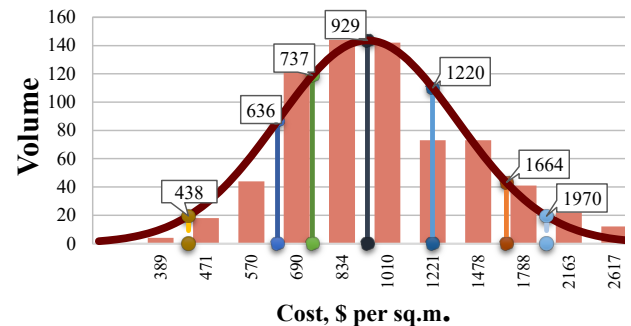
Kyiv. Cost, \$ per sq.m.



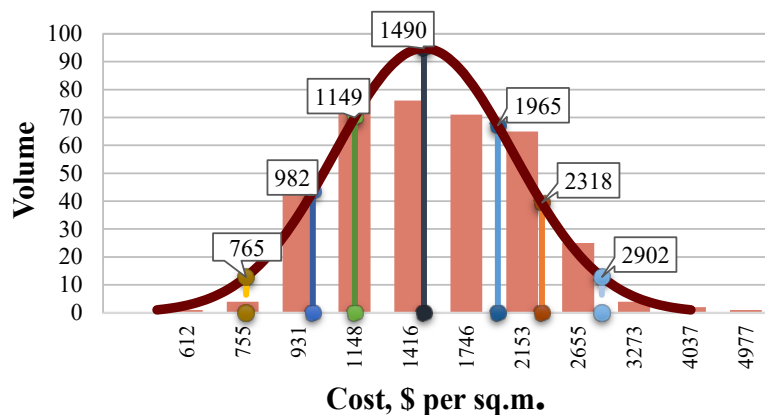
Odesa. Cost, \$ per sq.m.



Kharkiv. Cost, \$ per sq.m.



Dnipro Lviv. Cost, \$ per sq.m.



Lviv. Cost, \$ per sq.m.

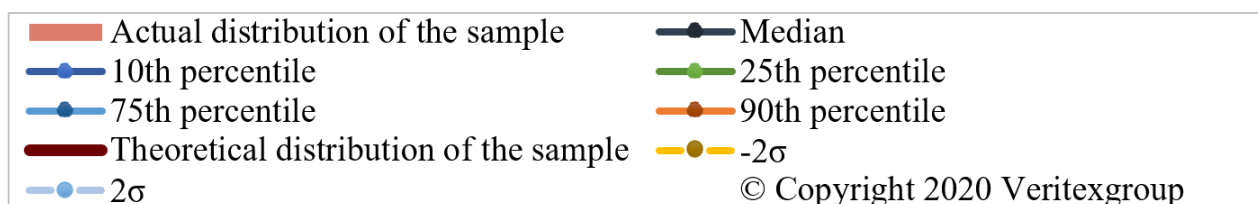


Fig. 1.6. Description of the density of distribution of the cost of 1 sq. m. of secondary market apartments in the largest cities of Ukraine as of December 2023 by the log-normal distribution law

Table 1.1. Parameters of distributions of the cost per square meter of secondary market apartments in regional centers of Ukraine as of December 2023

Region	Supply volume	Median (μ)	Average price	S_{lg} (σ)	Coefficient of variation	Lower bound of the confidence interval	Upper bound of the confidence interval
Ivano-Frankivsk	295	2,93	918,94	0,14	0,21	450,42	1611,06
Vinnytsia	131	2,98	1028,42	0,12	0,19	538,61	1679,93
Dnipro	693	2,97	1042,75	0,16	0,25	439,31	1962,71
Donetsk	11	2,83	690,99	0,11	0,16	412,48	1099,95
Zhytomyr	50	2,94	905,88	0,14	0,21	460,51	1630,14
Zaporizhzhia	295	2,79	647,88	0,14	0,22	315,96	1176,74
Kyiv	5471	3,22	1916,03	0,20	0,32	646,99	4207,97
Kropyvnytskyi	46	2,88	753,68	0,10	0,15	469,97	1196,88
Luhansk	11	2,90	849,26	0,14	0,22	410,34	1536,84
Lutsk	60	2,95	937,97	0,12	0,19	500,54	1575,70
Lviv	369	3,17	1594,51	0,15	0,22	762,32	2913,80
Mykolaiv	139	2,77	633,64	0,13	0,19	333,01	1057,94
Odesa	3106	3,00	1138,11	0,17	0,26	459,22	2184,87
Poltava	121	2,93	931,88	0,14	0,21	452,06	1603,15
Rivne	122	2,94	911,43	0,13	0,20	479,92	1581,80
Sumy	109	2,83	688,44	0,12	0,19	383,27	1192,32
Ternopil	110	2,93	861,69	0,11	0,18	498,68	1438,18
Uzhhorod	125	3,04	1229,97	0,13	0,20	601,75	2020,17
Kharkiv	1344	2,91	891,44	0,17	0,27	363,99	1792,87
Kherson	13	2,67	498,99	0,14	0,22	243,36	898,99
Khmelnysky	318	2,92	858,77	0,11	0,17	491,76	1379,04
Cherkasy	79	2,89	936,25	0,11	0,18	524,23	1511,04

It is important to establish the correlation between the cost per square meter and the total area of apartments. The analysis of this relationship for one, two, and more room apartments shows that the average cost per square meter is relatively stable up to the total area of approximately 65-70 square meters. Only starting from this level of total area, a significant increase in the cost per square meter is observed. The dependence of the average cost on the area of apartments is presented below in the form of ranges (Figure 1.7, Figure 1.8).

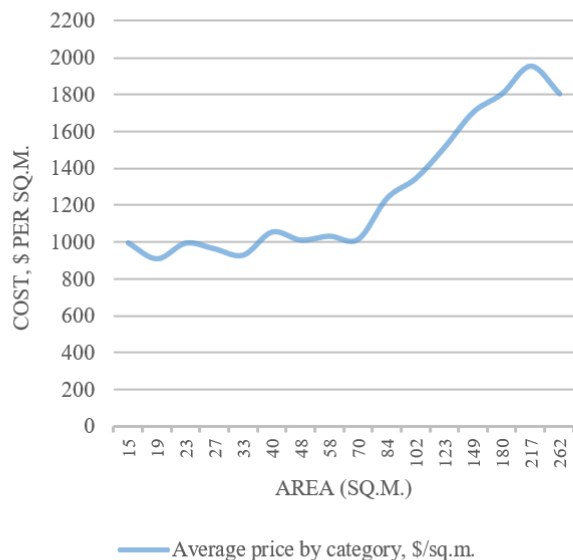


Fig. 1.7. Dependency of the average cost on the area of apartments in Ukraine in December 2023



Fig. 1.8. Dependency of the average cost on the area of apartments in Kyiv in December 2023

At the same time, for one-bedroom apartments, the dependence of the cost per square meter on the apartment's area is directly proportional, as with the increase in the area, a single living room becomes more spacious, and the value of one square meter becomes larger.

Factor analysis is a cornerstone in processing large volumes of data. It allows predicting and modeling the influence of various factors on the target indicator. Without collecting systematically organized market information and its in-depth analysis, the study of the impact of individual factors is impossible.

Below is an example of factor analysis of the influence of the floor (Table 1.2), type of renovation (Table 1.3), and number of rooms (Table 1.4) in the secondary housing market on the cost per square meter, considering the building's floor level (distinguishing between new and old construction) and location. It is assumed that major cities and the rest of Ukraine have different dynamics of local economic processes.

Table 1.2. Dependence of the median cost of 1 square meter on the building's floor level, location, and apartment floor

Number of floors at the building	Location	Floor of the apartment	Median cost, \$ per m2	Absolute difference with the baseline, \$ per m2	Relative difference from baseline, %
More than 9 floors	Ukraine as a whole	First	436	0	-0,04%
		Average	436	0	0,00%
		Last	394	-42	-9,72%
	The biggest cities *	First	987	-388	-28,20%
		Average	1375	0	0,00%
		Last	1224	-151	-11,00%
	Other cities	First	879	-89	-9,22%
		Average	968	0	0,00%
		Last	885	-83	-8,57%
Less or exactly 9 floors	Ukraine as a whole	First	310	-10	-3,08%
		Average	319	0	0,00%
		Last	272	-48	-14,88%
	The biggest cities *	First	920	-179	-16,26%
		Average	1099	0	0,00%
		Last	967	-132	-12,01%
	Other cities	First	729	-64	-8,03%
		Average	793	0	0,00%
		Last	700	-93	-11,69%

* Kyiv, Dnipro, Lviv, Odessa, Kharkiv

Table 1.3. Dependence of the median cost of 1 square meter on the building's floor level, location, and the category of apartment renovation

Number of floors at the building	Location	Category of renovation	Median cost, \$ per m2	Absolute difference with the baseline, \$ per m2	Relative difference from baseline, %
More than 9 floors	Ukraine as a whole	Housing condition	815	0	0,00%
		Just built	1042	227	27,89%
		Cosmetic repair	978	163	19,99%
		Eurorenovation	1319	505	61,93%
		Author's project	2000	1185	145,46%
	The biggest cities *	Housing condition	994	0	0,00%
		Just built	1203	209	20,98%
		Cosmetic repair	1000	6	0,59%

		Eurorenovation	1500	506	50,88%
		Author's project	2243	1249	125,63%
	Other cities	Housing condition	631	0	0,00%
		Just built	748	117	18,54%
		Cosmetic repair	820	189	30,03%
		Eurorenovation	1049	419	66,39%
Author's project	1178	547	86,80%		
Less or exactly 9 floors	Ukraine as a whole	Housing condition	455	0	0,00%
		Just built	769	315	69,23%
		Cosmetic repair	763	308	67,84%
		Eurorenovation	1016	562	123,59%
		Author's project	1413	959	210,95%
	The biggest cities *	Housing condition	902	0	0,00%
		Just built	841	-61	-6,75%
		Cosmetic repair	876	-26	-2,90%
		Eurorenovation	1200	298	32,98%
		Author's project	2057	1155	127,99%
	Other cities	Housing condition	386	0	0,00%
		Just built	720	334	86,55%
		Cosmetic repair	694	308	79,85%
		Eurorenovation	930	544	141,02%
		Author's project	1100	714	185,00%

* Kyiv, Dnipro, Lviv, Odessa, Kharkiv

Table 1.4. Dependence of the median cost of 1 square meter on the building's floor level, location, and the number of rooms

Number of floors at the building	Location	Number of rooms	Median cost, \$ per m2	Absolute difference with the baseline, \$ per m2	Relative difference from baseline, %
More than 9 floors	Ukraine as a whole	1	1202	0	0,00%
		2	1235	33	2,74%
		3	1282	79	6,60%
		4	1592	390	32,44%
		5	1786	583	48,51%
	The biggest cities *	1	1293	0	0,00%
		2	1341	49	3,77%
		3	1381	88	6,80%
		4	1695	403	31,14%
		5	1905	612	47,35%
Other cities	1	992	0	0,00%	

		2	947	-45	-4,50%
		3	888	-104	-10,52%
		4	805	-187	-18,81%
		5	848	-144	-14,55%
Less or exactly 9 floors	Ukraine as a whole	1	955	0	0,00%
		2	875	-80	-8,33%
		3	830	-124	-13,00%
		4	852	-102	-10,70%
		5	998	43	4,55%
	The biggest cities *	1	1083	0	0,00%
		2	1021	-62	-5,76%
		3	978	-105	-9,70%
		4	1011	-72	-6,65%
		5	1068	-15	-1,42%
	Other cities	1	837	0	0,00%
		2	760	-77	-9,21%
		3	700	-137	-16,38%
		4	679	-158	-18,89%
		5	613	-224	-26,79%

* Kyiv, Dnipro, Lviv, Odessa, Kharkiv

Based on the obtained results, it can be stated that the floor of the apartment affects the cost differently, depending on the location and type of building fund. In new buildings, apartments on the top floor usually have the best panoramic views. Apartments on the top floor in old buildings do not have such an advantage, so their cost decreases. Therefore, in new buildings, the top floor is more expensive than the first, and vice versa for the old fund. The cost of the first and last floors for the old fund in major cities is approximately at parity.

The analysis of the impact of the renovation class on the cost of housing allows us to conclude that the price difference between a habitable condition and cosmetic repairs is practically absent in major cities, regardless of the type of building fund. In turn, the presence of euro renovation or elite-level housing significantly increases its cost.

An important element of the real estate market analysis is determining the temporal dynamics of its development. The information provided in Figures 1.9, 1.10, 1.11 demonstrates the dynamics of a slight decline in housing prices by the end of 2023 overall in Ukraine, especially in Kyiv and Kharkiv. The price dynamics in Odesa were more stable. An increasing trend in this indicator is observed in Dnipro and Lviv. It is noteworthy that the highest median price value was recorded in July (\$1,200 per sq.m.), while the lowest value was in October

(\$968 per sq.m.). After this decline, the market began to recover and almost reached the January level by the end of the year.

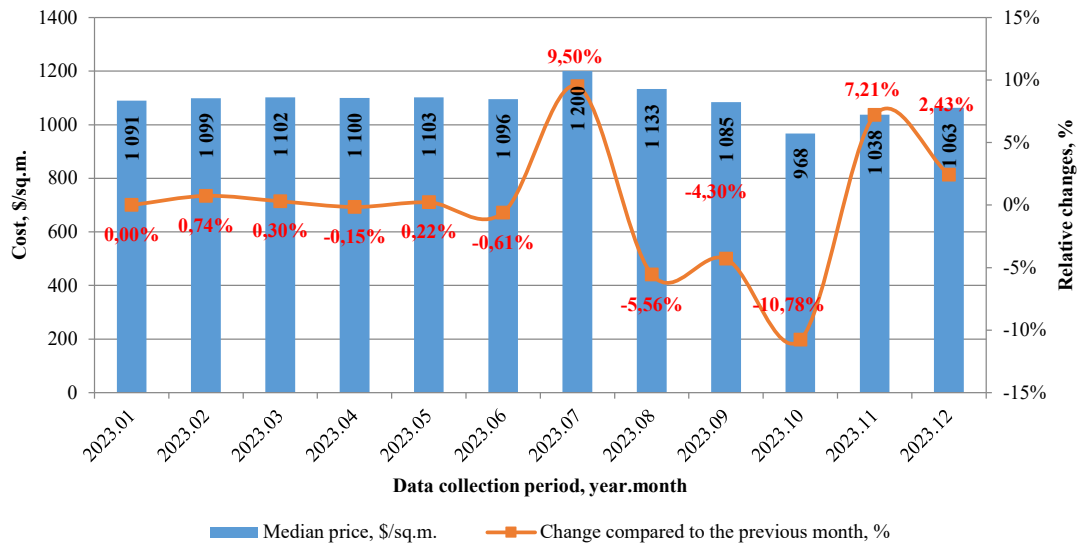


Fig. 1.9. Dynamics of changes in the median value of the cost per square meter of apartments on the secondary housing market in Ukraine in 2023

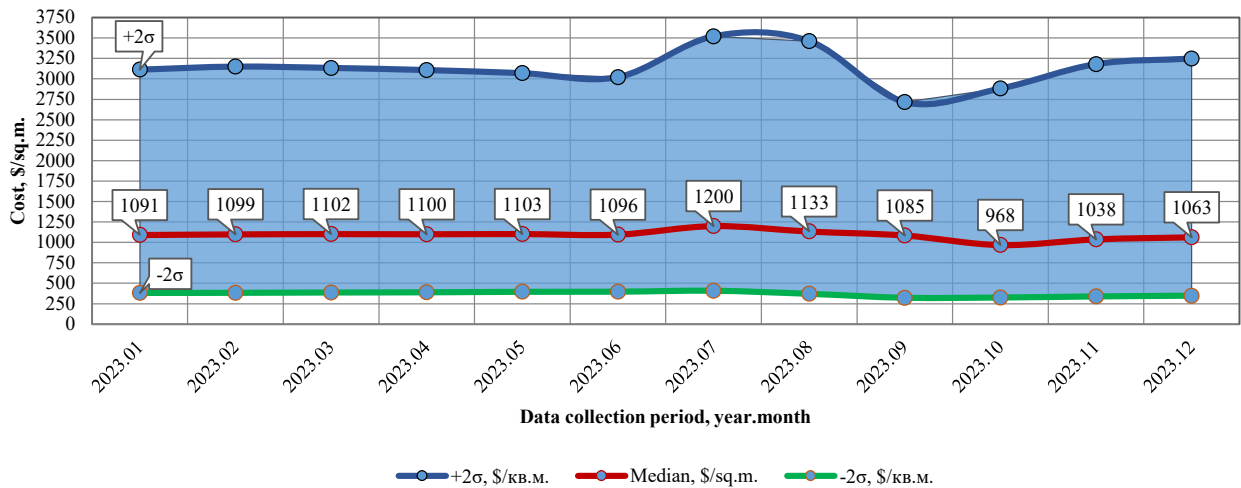
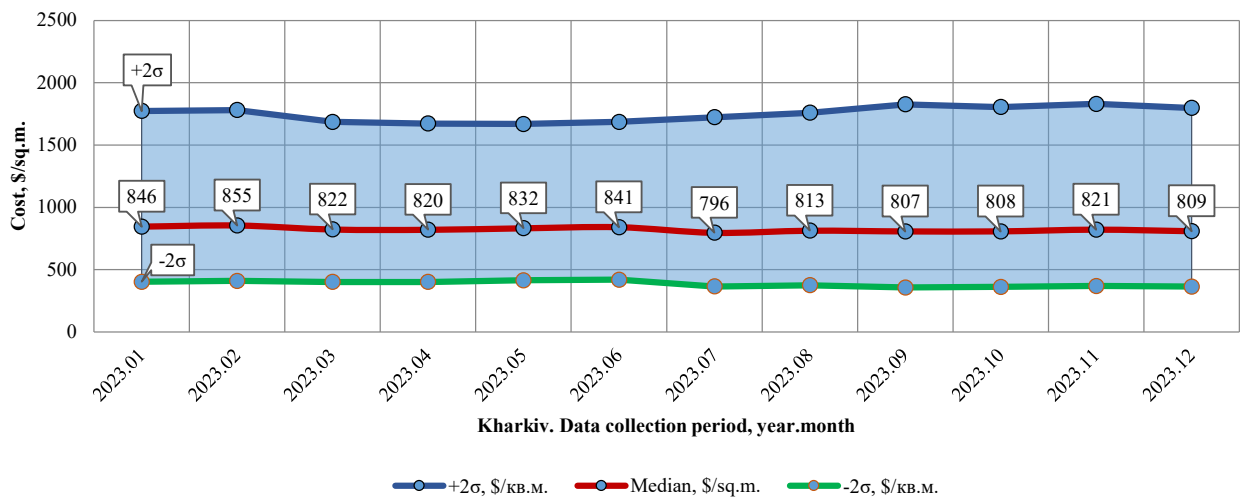
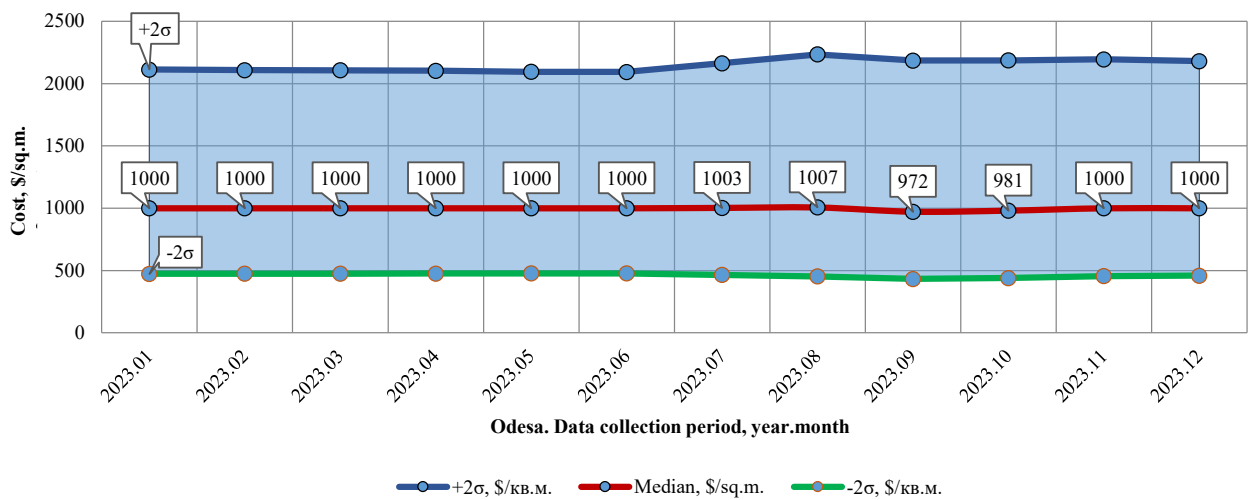
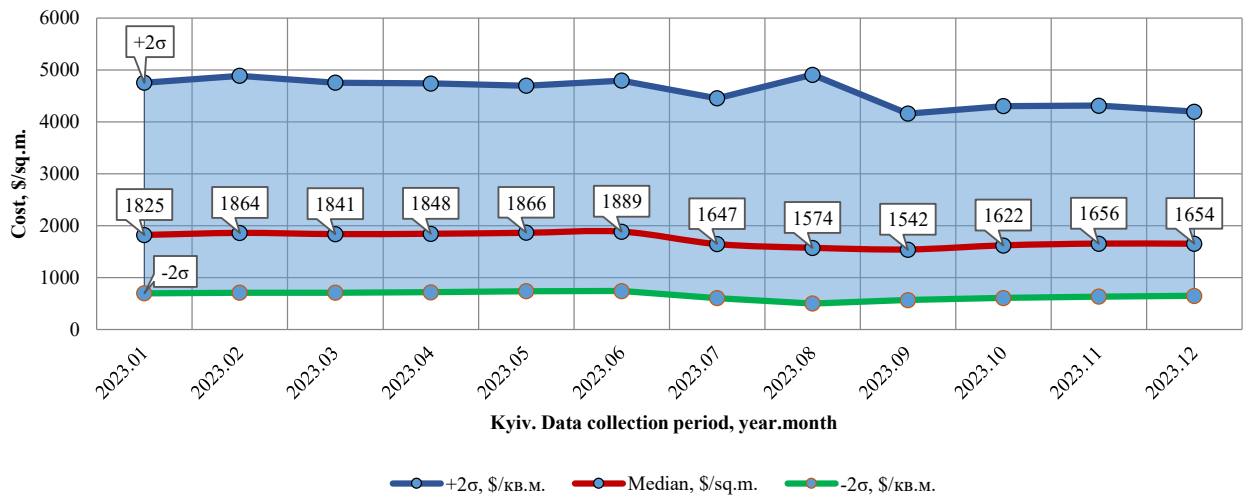


Fig. 1.10. Dynamics of median and extreme (95.46%) levels of the cost per square meter of housing in Ukraine as of December 2023



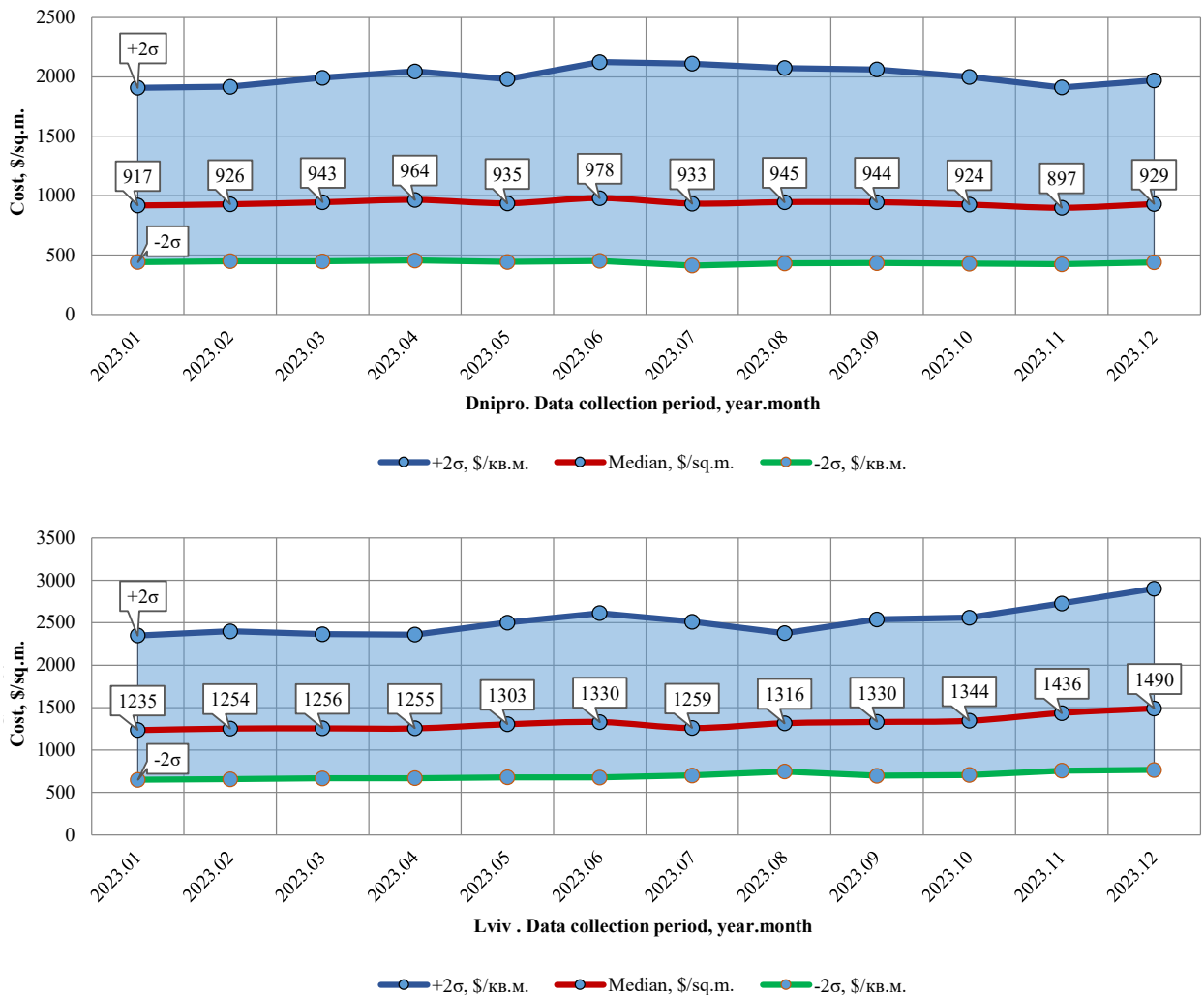


Fig. 1.11. Dynamics of median and extreme (95.46%) levels of the cost per square meter of housing in the largest cities as of December 2023

Compared to 2022, when significant fluctuations and a decline in the dynamics of dispersion and the coefficient of variation were observed, the indicators in 2023 were more stable. This trend is more characteristic, especially for the largest cities in Ukraine (Fig. 1.12, 1.13). The most stable dynamics were observed in Lviv and Dnipro. Some fluctuations were observed across Ukraine, with slight increases in these indicators in Kyiv, Kharkiv, and Odesa.

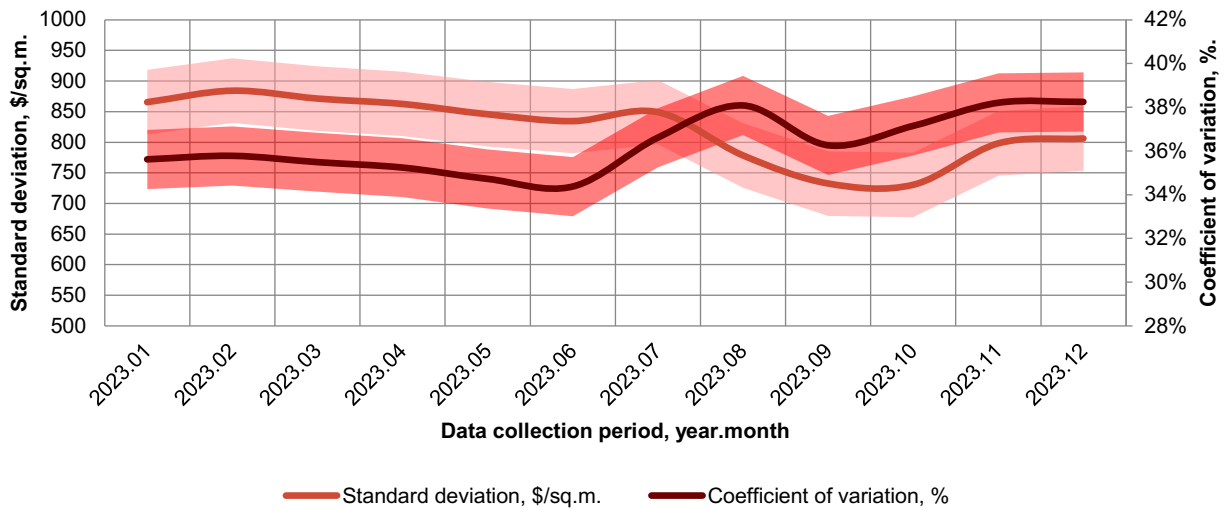
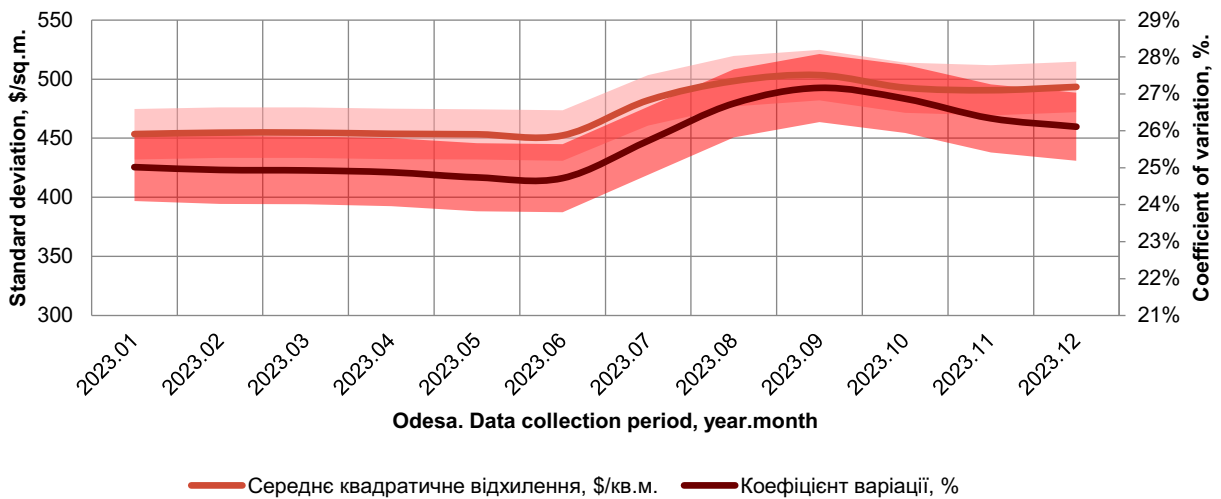
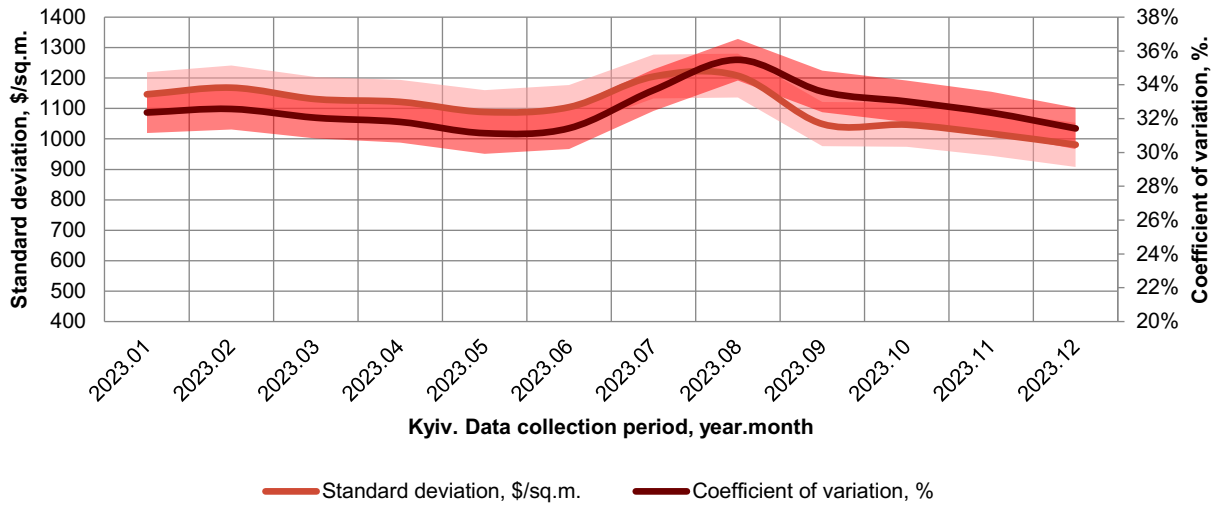


Fig. 1.12. Dynamics of the dispersion and coefficient of variation of the cost per square meter on the secondary housing market in Ukraine, 2023



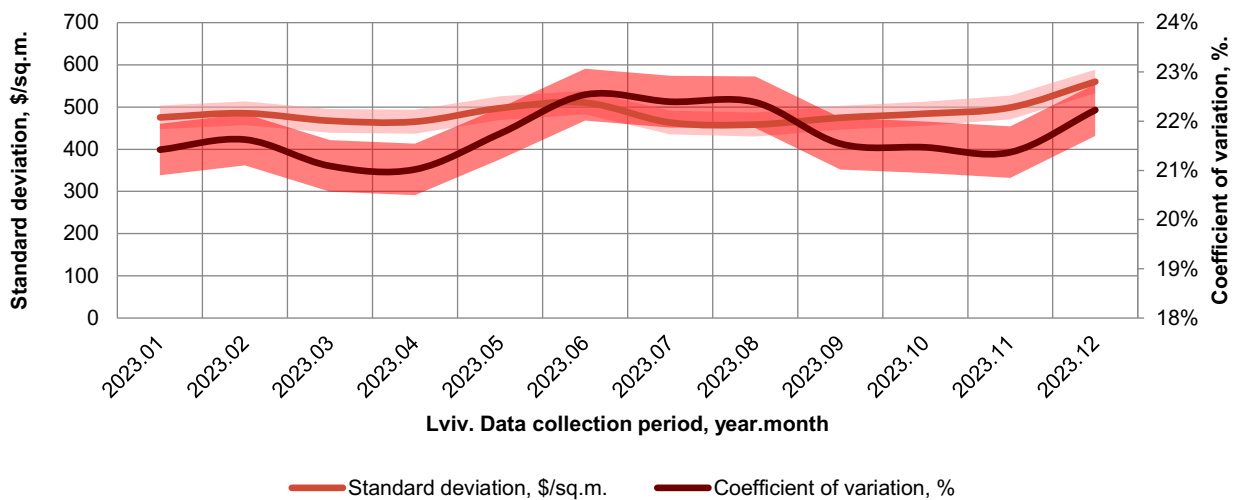
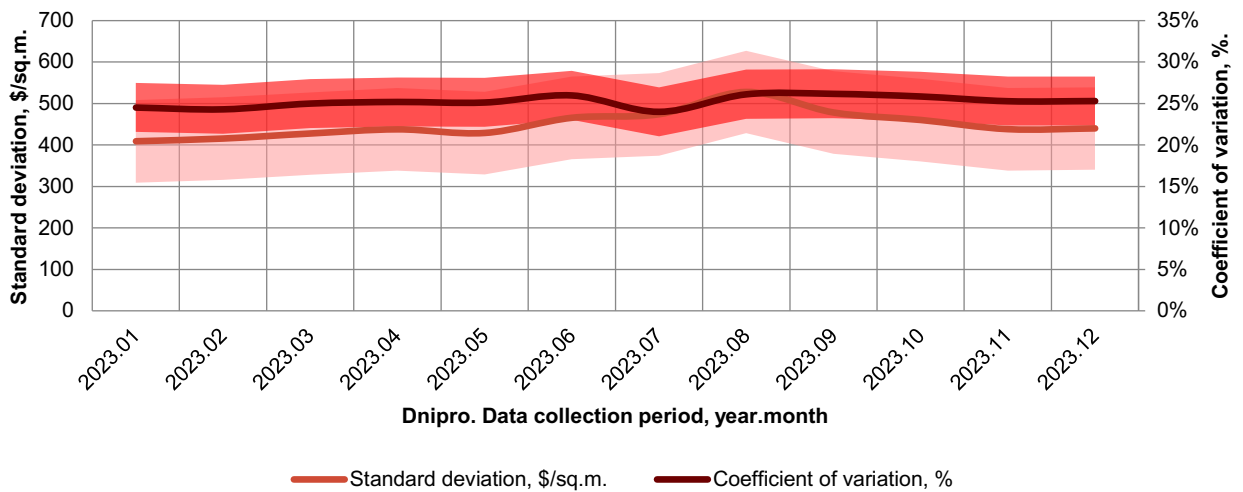
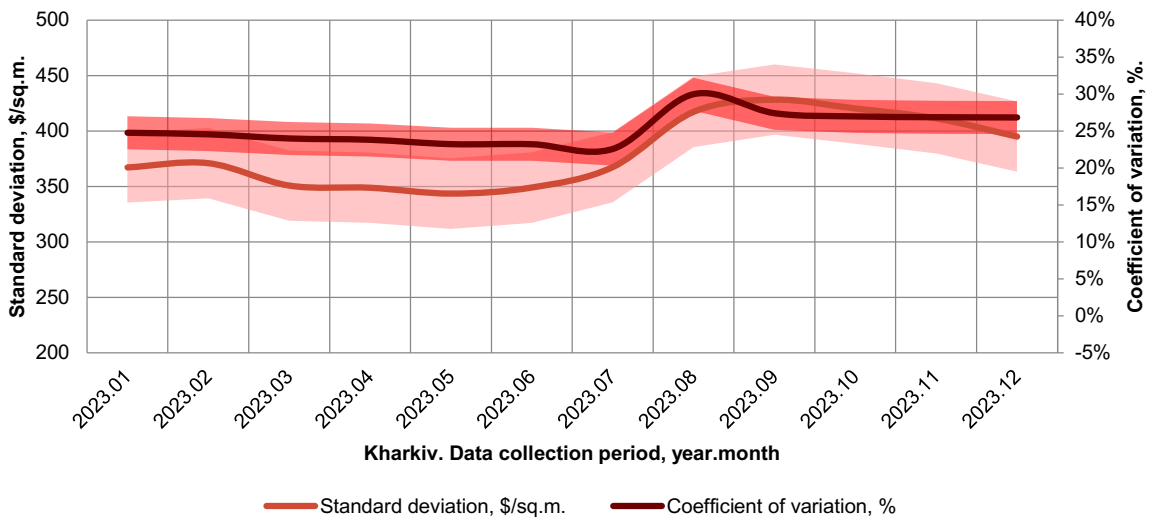


Fig. 1.13. Dynamics of dispersion and coefficient of variation of the cost per square meter on the secondary housing market in the largest cities of Ukraine, 2023

The information base of the real estate market is constantly being replenished and updated, allowing for the expansion of its analytics using modern methods of mathematical and statistical processing of results. This enables obtaining the most substantiated and reliable parameters of this market and its evolution, determining the impact of a wide range of individual pricing factors.

- The year 2023, like 2022, was highly unpredictable due to objective reasons associated with the continuation of full-scale war, making the market reaction difficult to forecast. There is a noticeable downward trend in the number of listings, leading to an overall contraction of the market.

- It is worth noting that such a trend in 2023 is not characteristic of all cities. For example, Kharkiv, a front-line city heavily affected by shelling, experienced a corresponding decrease in prices and demand. Clearly, the cost per square meter significantly increased in western regions, as seen in the price dynamics graph in Lviv. Similar trends were observed in Ivano-Frankivsk and Volyn. This situation is entirely predictable, as these regions attracted a larger portion of temporarily displaced and evacuated individuals. A similar pattern was observed in Kyiv after the liberation of the region and the halt of the advance towards the capital.

- Some regions are not far from active conflict zones, yet prices continue to rise in Dnipropetrovsk Oblast. This is again associated with resettlements, as people chose relatively safe regions closer to their hometowns. The reduction in the number of listings provoked a price increase.

- Cities like Odessa did not undergo significant changes, as this direction was popular even before the war. The least increase in prices affected the front-line regions. For instance, in Kharkiv, prices noticeably declined, and we can make assumptions.

In summary, the research on the overall price dynamics in the real estate market for 2023 shows a generally increasing trend, stimulated by a growing demand for residential square meters. The behavior of prices during crises caused by extraordinary events and conditions (pandemic and the onset of full-scale war) in 2020, 2022, and continuing to influence the current year is of particular interest in the context of the established real estate market dynamics over the past 12 years.

2. INFORMATION AND ANALYTICAL UNIT OF THE LAND MARKET

The information and analytical unit of the market of land plots is divided into three subdivisions according to their purpose:

- Land plots for residential and public buildings;
- Agricultural plots of land;
- Land plots for industrial development.

As of the end of December of 2023, the information base of the land market covers about 29,000 unique offers, where 51% are residential plots, 41% - agricultural plots, and 8% - industrial plots. The total value of the land market currently is 3.33 billion dollars. (Fig. 2.1).

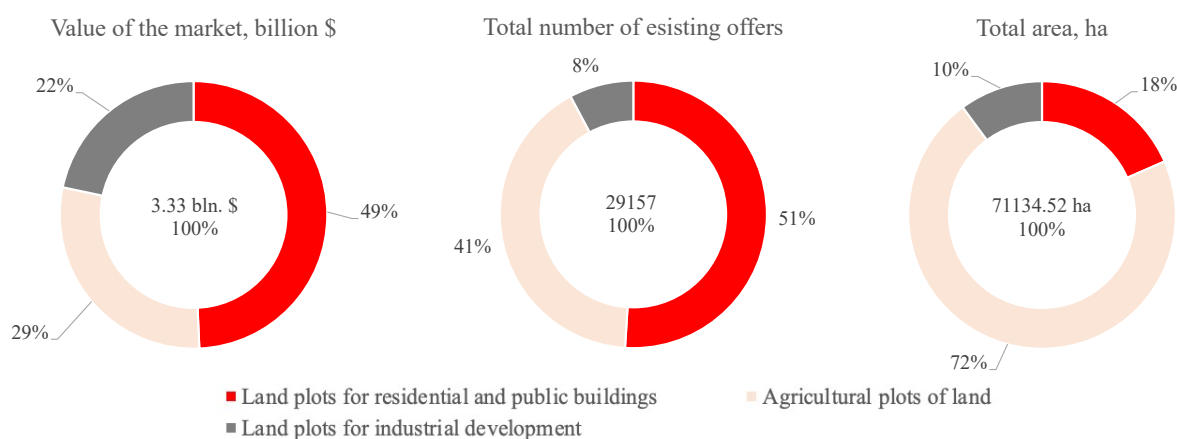


Fig. 2.1. Volume of the land market in Ukraine as of December 2023

Quarterly indicators of the volume of the land market in Ukraine for the period 2022-2023 give a dynamic description of the general picture, considering the influence of various factors that restrained or, on the contrary, revived market activity (Fig. 2.2, 2.3). The analysis of the specified indicators demonstrates a gradual recovery of the market in 2022-2023. The dynamics of the number of offerings follow a wave-like pattern, experiencing periods of growth and decline with a certain periodicity. From the analysis of the land market volume, we also observe how the market is gradually recovering from the shock caused by the full-scale invasion, showing a tendency towards slow restoration.

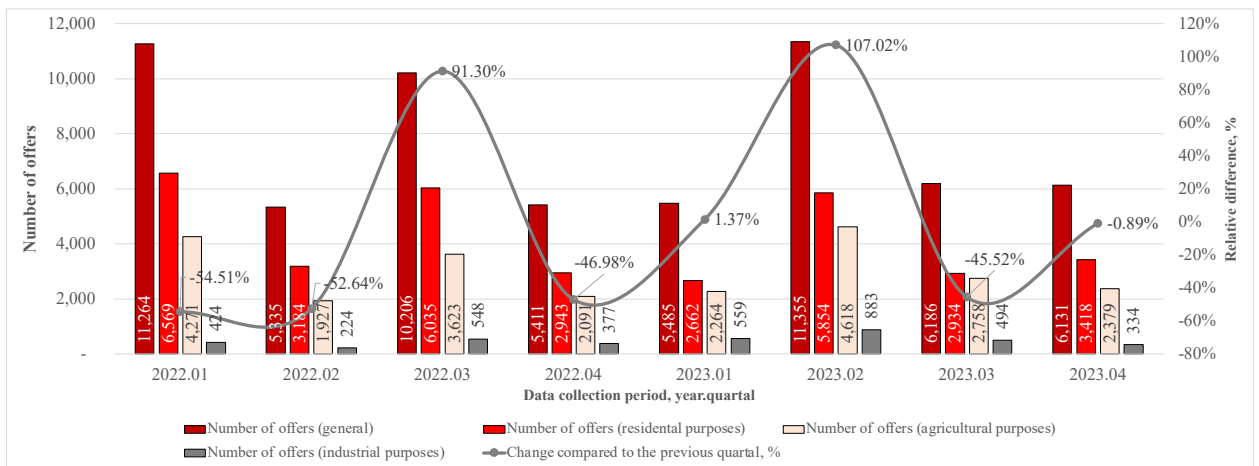


Fig. 2.2. Evolution of the number of offers on the land market in Ukraine, 2022-2023

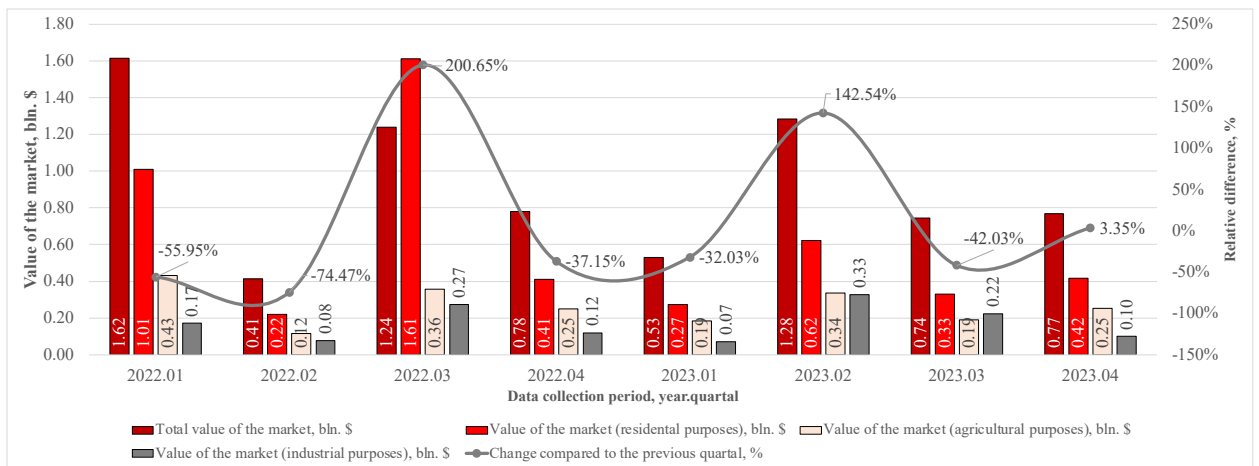


Fig. 2.3. Evolution of the value of the land market in Ukraine, 2022-2023

The conducted analysis showed that the distribution of prices on the land market is also subject to the lognormal distribution law, which was adopted as the theoretical distribution law (Fig. 2.4, 2.5). As a unit of measurement of the area of land plots, one hectare is accepted as the most widely used.

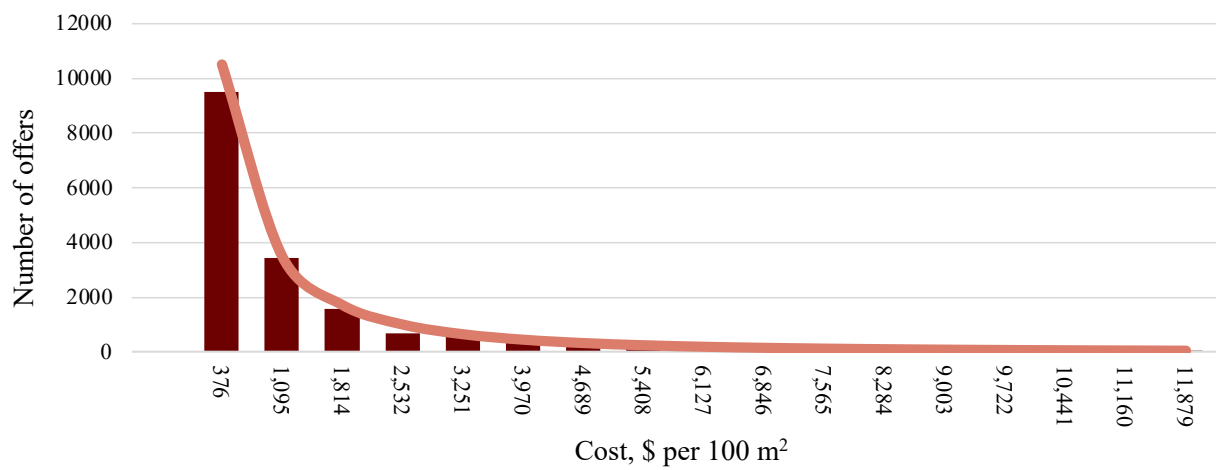


Fig. 2.4. Density distribution cost of 1 m² on the land market of Ukraine as of December 2023

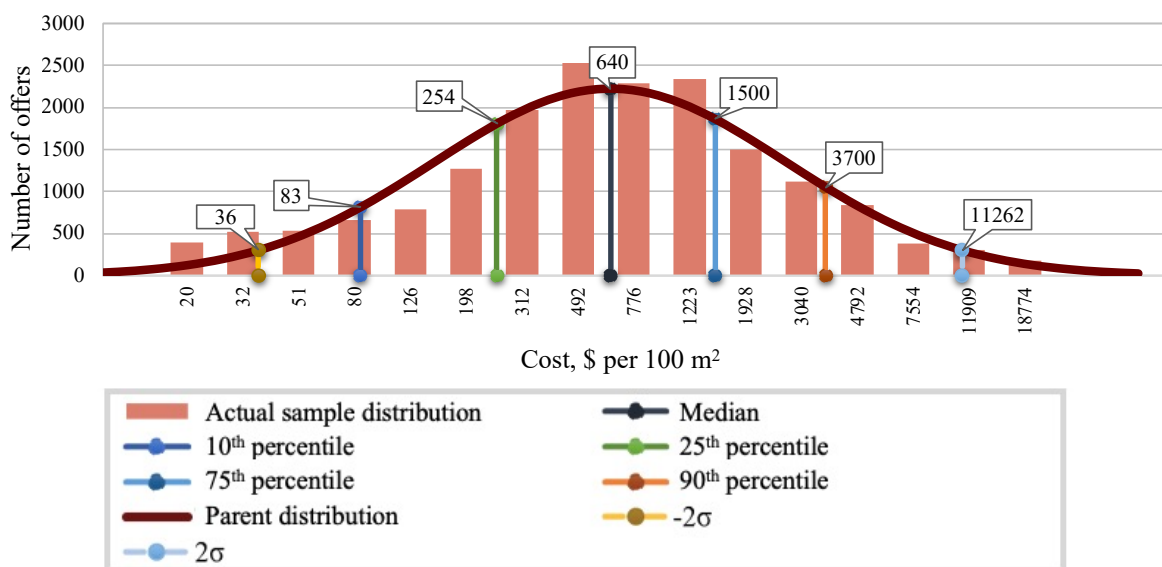
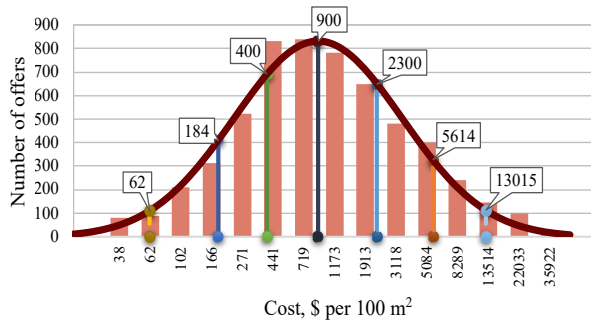
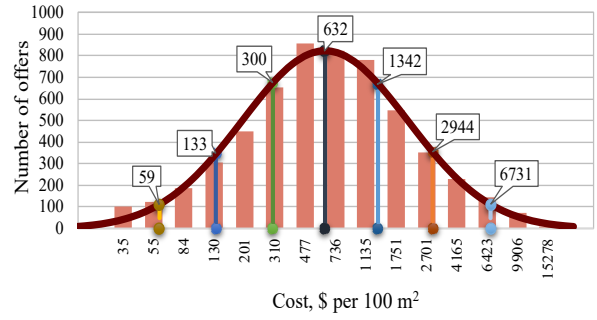


Fig. 2.5. Description of the density distribution of the cost of 1 m² on the land market of Ukraine as of December 2023 according to the log-normal distribution law

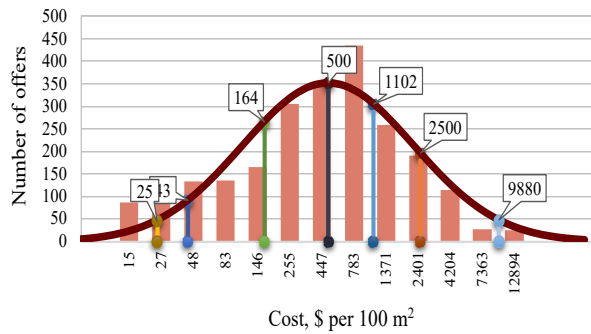
Checking the validity of this conclusion for a large number of statistical samples for separate regions and different time intervals confirmed its reasonableness (Fig. 2.6).



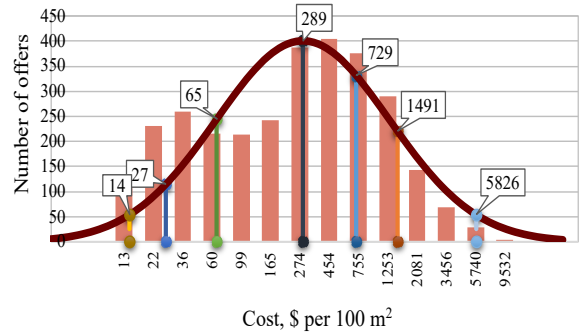
Land plots for residential buildings, central agglomerations. Cost: \$ per 100 m²



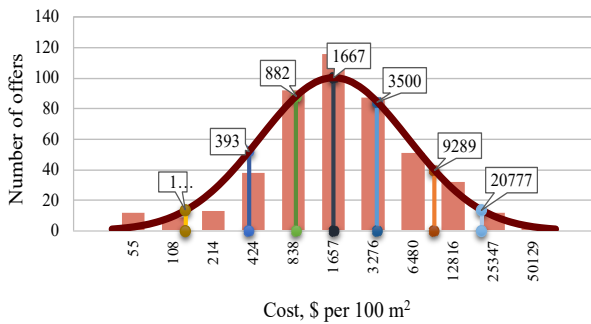
Land plots for residential buildings, periphery. Cost: \$ per 100 m²



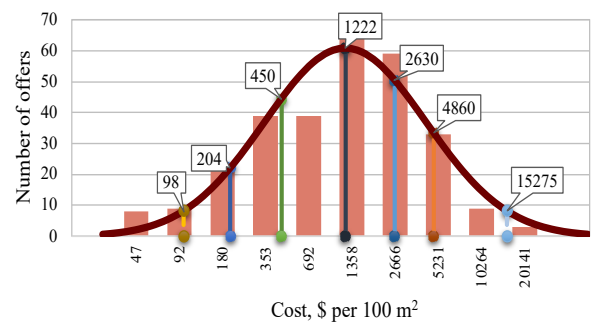
Agricultural plots of land, central agglomerations. Cost: \$ per 100 m²



Agricultural plots of land, periphery. Cost: \$ per 100 m²



Land plots for industrial development, central agglomerations. Cost: \$ per 100 m²



Land plots for industrial development, periphery. Cost: \$ per 100 m²

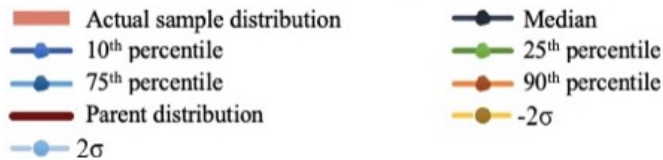


Fig. 2.6. Description of the density of the distribution of the cost of 100 m² land on the market of Ukraine depending on the type of land use and geographical cluster as of December 2023 according to the log-normal distribution law

The consolidated table of land value distribution parameters for all regions without exception includes not only the average and median values, but also the level of their dispersion and variation, which fully describes the probabilistic-statistical parameters of these distributions (tables 2.1 - 2.3). These tables show data for the "mean plus and minus 2 σ " values, which correspond to the limits of 95.46% of the corresponding distribution.

The data provided in Tables 2.1 – 2.3 indicate significant differences both in the average cost levels among different regions, exceeding threefold, and in the degrees of their volatility. Therefore, obtaining only averaged value indicators for each individual region or area is insufficient, considering the geographical zoning and regionalization of cost indicators.

Table 2.1. Parameters of cost distribution 100 m² of land market (land plots for residential and public buildings) in regional centers of Ukraine as of December 2023

Region	Amount of offers	Median (μ)	Average	S _{lg} (σ)	Coefficient of variations	Lower confidence limit interval	Upper confidence limit interval
Chernihiv Region	177	2.54	503.20	0.46	0.79	42.27	2842.54
Kirovohrad Region	129	2.60	730.79	0.50	0.89	39.24	4077.89
Poltava Region	349	2.60	731.81	0.45	0.78	49.83	3211.20
Volyn Region	448	2.70	811.48	0.48	0.84	54.17	4615.30
Sumy Region	91	2.60	843.04	0.51	0.90	38.69	4135.08
Zhytomyr Region	416	2.70	850.55	0.49	0.87	51.67	4838.49
Rivne Region	414	2.70	958.70	0.45	0.77	62.91	3973.62
Mykolaiv Region	157	2.73	984.52	0.47	0.82	60.34	4781.26
Zaporizhia Region	119	2.82	1017.47	0.47	0.82	75.89	5856.18
Cherkasy Region	270	2.69	1047.05	0.52	0.92	45.15	5223.87
Ternopil Region	222	2.87	1124.50	0.43	0.73	103.18	5343.85
Kherson Region	15	3.12	1161.05	0.41	0.69	201.04	8842.79
Khmelnitskyi Region	293	2.77	1210.17	0.50	0.88	59.07	5760.54
Dnipropetrovsk Region	639	2.86	1442.68	0.55	1.01	56.67	9148.19
Donetsk Region	29	2.82	1457.66	0.50	0.87	67.87	6548.14
Zakarpattia Region	515	2.96	1507.08	0.49	0.87	95.31	8900.85
Chernivtsi Region	261	2.90	1509.70	0.60	1.14	49.64	12437.51

Lviv Region	1284	2.94	1562.01	0.50	0.88	87.42	8523.58
Ivano-Frankivsk Region	631	2.98	1681.59	0.65	1.29	46.85	19264.60
Kharkiv Region	300	2.83	1731.20	0.58	1.09	45.98	9859.92
Vinnitsia Region	507	2.95	1920.01	0.54	0.98	73.73	10559.14
Kyiv Region	3146	2.90	2036.18	0.59	1.11	52.83	12114.36
Luhansk Region	9	3.11	5015.21	0.81	1.89	30.73	54989.01

Table 2.2. Parameters of cost distribution 100 m² of land market (agricultural plots of land) in regional centers of Ukraine as of December 2023

Region	Amount of offers	Median (μ)	Average	S_{lg} (σ)	Coefficient of variations	Lower confidence limit interval	Upper confidence limit interval
Lviv Region	567	2.84	1121.93	0.54	0.97	57.95	8271.14
Ivano-Frankivsk Region	412	2.83	1147.80	0.66	1.33	31.60	14250.91
Zakarpattia Region	263	2.74	911.65	0.53	0.96	46.93	6445.63
Odesa Region	264	2.70	1136.59	0.73	1.54	17.68	14143.13
Kyiv Region	1321	2.70	1118.90	0.59	1.10	33.74	7409.19
Chernivtsi Region	151	2.66	760.64	0.59	1.11	30.44	6900.54
Vinnitsia Region	201	2.64	937.56	0.63	1.23	23.71	8103.48
Kherson Region	4	2.60	956.88	0.74	1.61	12.93	12242.40
Volyn Region	142	2.59	585.21	0.53	0.95	34.53	4455.45
Ternopil Region	90	2.58	536.36	0.51	0.90	36.85	3876.55
Khmelnitskyi Region	219	2.48	590.43	0.55	1.00	23.95	3757.96
Rivne Region	211	2.44	454.48	0.48	0.84	29.71	2516.91
Zhytomyr Region	171	2.40	408.89	0.53	0.94	22.28	2805.39
Zaporizhia Region	52	2.33	447.41	0.58	1.07	14.98	3032.05
Kharkiv Region	98	2.31	576.72	0.72	1.50	7.61	5519.59
Dnipropetrovsk Region	271	2.23	561.43	0.70	1.46	6.68	4324.91
Poltava Region	229	2.20	329.09	0.60	1.13	10.08	2486.77
Chernihiv Region	159	2.18	283.63	0.61	1.17	9.01	2496.00
Sumy Region	49	2.18	332.35	0.66	1.30	7.29	3088.23
Cherkasy Region	141	2.16	327.33	0.54	0.98	12.01	1761.62
Mykolaiv Region	59	1.75	285.52	0.67	1.33	2.65	1216.12

Kirovohrad Region	64	1.71	330.39	0.61	1.17	3.10	857.02
Luhansk Region	2	1.60	40.54	0.15	0.22	20.11	77.25
Donetsk Region	10	1.37	152.73	0.64	1.25	1.22	441.21

Table 2.3. Parameters of cost distribution 100 m² of land market (land plots for industrial development) in regional centers of Ukraine as of December 2023

Region	Amount of offers	Median (μ)	Average	S_{lg} (σ)	Coefficient of variations	Lower confidence limit interval	Upper confidence limit interval
Kharkiv Region	3	3.52	4457.78	1.27	6.31	9.64	1152266.89
Lviv Region	86	3.34	2964.80	0.64	1.25	115.91	41754.89
Rivne Region	24	3.30	2175.16	0.50	0.87	203.63	19480.26
Vinnitsia Region	19	3.25	2048.41	0.32	0.51	412.52	7510.06
Ivano-Frankivsk Region	39	3.20	2317.89	0.69	1.41	66.32	37900.47
Zakarpattia Region	19	3.18	2415.75	0.61	1.18	88.75	25352.51
Ternopil Region	13	3.18	2593.80	0.59	1.11	99.45	22623.71
Kyiv Region	277	3.18	2931.95	0.58	1.07	106.02	21222.12
Zaporizhia Region	3	3.13	2315.23	0.30	0.47	348.89	5329.73
Odesa Region	91	3.11	2648.16	0.54	0.97	109.44	15441.78
Kherson Region	1	3.09	1222.50	-	-	-	-
Volyn Region	28	3.05	1647.73	0.59	1.12	72.85	17321.45
Khmelnitskyi Region	15	3.04	1791.99	0.48	0.83	121.00	10000.04
Chernivtsi Region	12	3.02	1745.95	0.51	0.91	99.81	11148.37
Zhytomyr Region	27	2.92	1254.40	0.40	0.67	132.65	5235.11
Mykolaiv Region	6	2.92	787.61	0.56	1.04	62.01	11058.33
Dnipropetrovsk Region	45	2.88	1491.38	0.71	1.47	29.05	19365.32
Poltava Region	12	2.83	860.81	0.44	0.75	89.77	5198.22
Cherkasy Region	10	2.69	1057.30	0.49	0.87	50.41	4761.24
Kirovohrad Region	8	2.65	1207.98	0.77	1.71	12.81	15406.51
Chernihiv Region	3	2.64	710.03	0.38	0.63	77.21	2521.03
Donetsk Region	1	2.43	270.71	-	-	-	-

The dependency of the cost of 1 square meter of land on the total size of the plot for residential and agricultural purposes is demonstrated in Figures 2.7 – 2.10. The obtained quantitative equations, providing an approximation of these empirical relationships, allow for direct adjustments when correlating the cost of existing market offerings with appraisal objects.

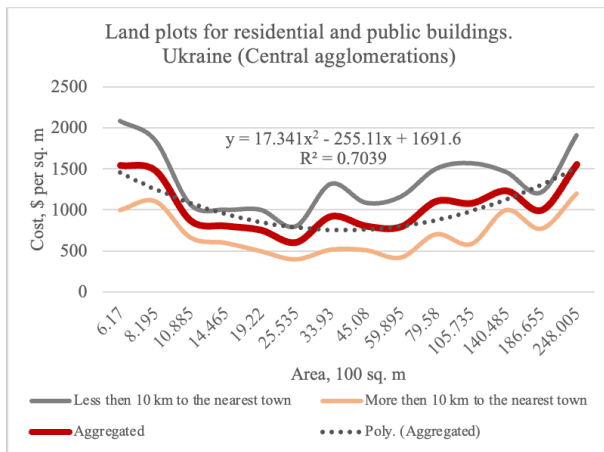


Fig. 2.7. Dependence of the value of 100 m² of residential land plots on their total area (Central agglomerations)

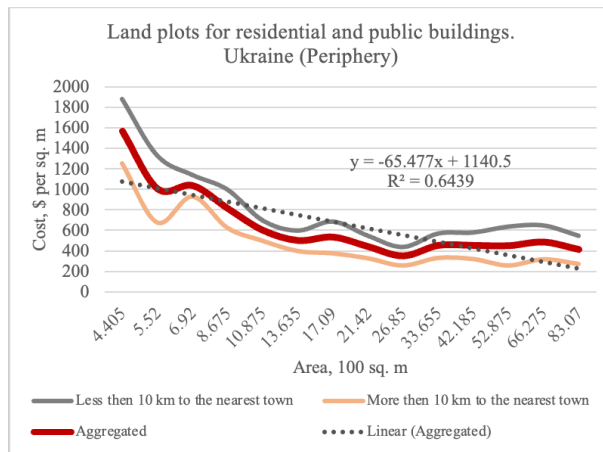


Fig. 2.8. Dependence of the value of 100 m² of residential land plots on their total area (Periphery)

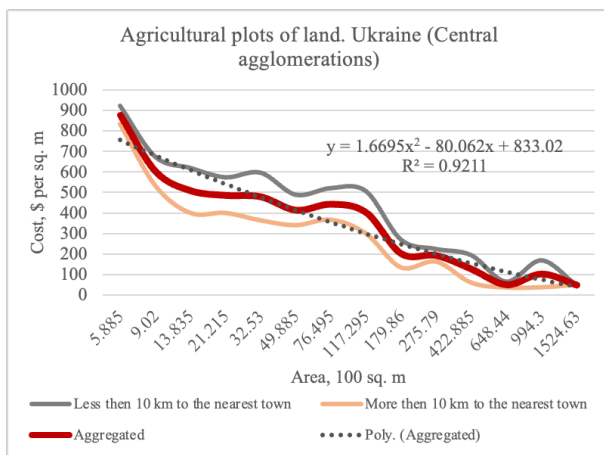


Fig. 2.9. Dependence of the value of 100 m² of agricultural land plots on their total area (Central agglomerations)

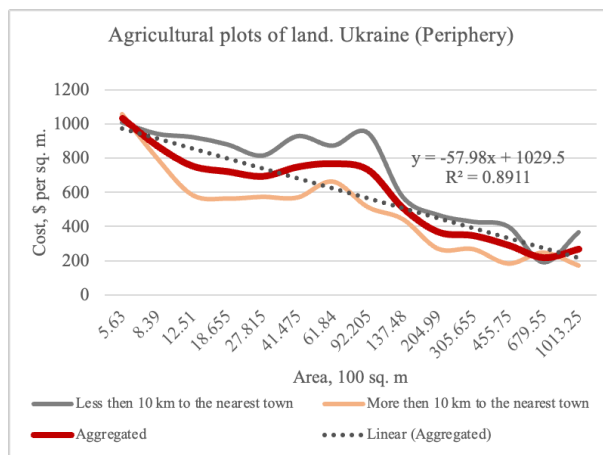


Fig. 2.10. Dependence of the value of 100 m² of agricultural land plots on their total area (Periphery)

In a generalized form, this information is presented in table 2.4, where the median cost of 100 m² is provided depending on the category of land use, distance from the nearest cities and regions of location. The sizes of land plots are conditionally divided into up to 2500 m² and more than 2500 m², since in Ukraine most often no more than 2500 m² are allocated for one household.

Table 2.4. Dependence of the cost of 100 m² of land on the category of land use, region, distance to the nearest city and the size of the plot

Category of land use	Region	Distance to the nearest city	Plot size	Median cost, \$/100m ²	Absolute difference from the baseline, \$/100m ²	Relative difference from baseline, %
Land plots for residential and public buildings	Ukraine	Up to 10 km	General	1103.2	-	-
			More than 2500 m ²	1000.0	-103.2	-9.35%
			Up to 2500 m ²	1130.4	27.2	2.47%
		From 10 to 50 km	General	640.0	-	-
			More than 2500 m ²	551.7	-88.3	-13.79%
			Up to 2500 m ²	666.5	26.5	4.15%
	Central agglomerations *	Up to 10 km	General	1600.0	-	-
			More than 2500 m ²	1500.0	-100.0	-6.25%
			Up to 2500 m ²	1621.6	21.6	1.35%
		From 10 to 50 km	General	812.5	-	-
			More than 2500 m ²	747.3	-65.2	-8.02%
			Up to 2500 m ²	830.3	17.8	2.20%
	Periphery	Up to 10 km	General	933.3	-	-
			More than 2500 m ²	800.0	-133.3	-14.29%
			Up to 2500 m ²	950.0	16.7	1.79%
		From 10 to 50 km	General	434.8	-	-
			More than 2500 m ²	384.6	-50.2	-11.54%
			Up to 2500 m ²	450.0	15.2	3.50%
Agricultural plots of land	Ukraine	Up to 10 km	General	583.3	-	-
			More than 2500 m ²	400.0	-183.3	-31.43%
			Up to 2500 m ²	700.0	116.7	20.00%
		From 10 to 50 km	General	309.2	-	-
			More than 2500 m ²	150.0	-159.2	-51.48%
			Up to 2500 m ²	485.7	176.6	57.11%
	Central agglomerations *	Up to 10 km	General	706.7	-	-
			More than 2500 m ²	559.3	-147.4	-20.85%

		From 10 to 50 km	Up to 2500 m ²	826.0	119.3	16.88%	
			General	416.6	-	-	
			More than 2500 m ²	245.0	-171.6	-41.19%	
		Periphery	Up to 10 km	Up to 2500 m ²	618.6	201.9	48.47%
				General	500.0	-	-
				More than 2500 m ²	275.0	-225.0	-45.00%
	From 10 to 50 km	Up to 10 km	Up to 2500 m ²	650.0	150.0	30.00%	
			General	216.3	-	-	
			More than 2500 m ²	79.7	-136.6	-63.15%	
	Industrial plots of land	Ukraine	Up to 10 km	Up to 2500 m ²	375.0	158.7	73.39%
				General	216.3	-	-
				More than 2500 m ²	79.7	-136.6	-63.15%
From 10 to 50 km			Up to 10 km	General	1636.4	-	-
				More than 2500 m ²	1329.8	-306.5	-18.73%
				Up to 2500 m ²	4000.0	2363.6	144.44%
From 10 to 50 km		From 10 to 50 km	General	1000.0	-	-	
			More than 2500 m ²	1000.0	0.0	0.00%	
			Up to 2500 m ²	2383.3	1383.3	138.33%	
Central agglomerations *		Up to 10 km	Up to 10 km	General	1747.1	-	-
				More than 2500 m ²	1500.0	-247.1	-14.14%
				Up to 2500 m ²	5000.0	3252.9	186.19%
	From 10 to 50 km	From 10 to 50 km	General	1101.3	-	-	
			More than 2500 m ²	1000.0	-101.3	-9.20%	
			Up to 2500 m ²	2500.0	1398.7	127.01%	
Periphery	Up to 10 km	Up to 10 km	General	1500.0	-	-	
			More than 2500 m ²	1039.9	-460.1	-30.67%	
			Up to 2500 m ²	3116.0	1616.0	107.73%	
	From 10 to 50 km	From 10 to 50 km	General	593.4	-	-	
			More than 2500 m ²	450.0	-143.4	-24.16%	
			Up to 2500 m ²	1848.2	1254.8	211.48%	

* Kyiv region, Odesa region, Lviv region, Kharkiv region, Dnipropetrovsk region

An essential element of the analysis of the original information base of the real estate market is the determination of the time dynamics of its development. The information provided in Figures 2.11 – 2.13 demonstrates the relative stabilization of land values with minor fluctuations until mid-2023, after which a gradual price increase began. The indicator has nearly returned to the pre-war state.



Fig. 2.11. Evolution of changes in the median value of the price per 100 m² of land plots on the residential land market in Ukraine as of December 2023

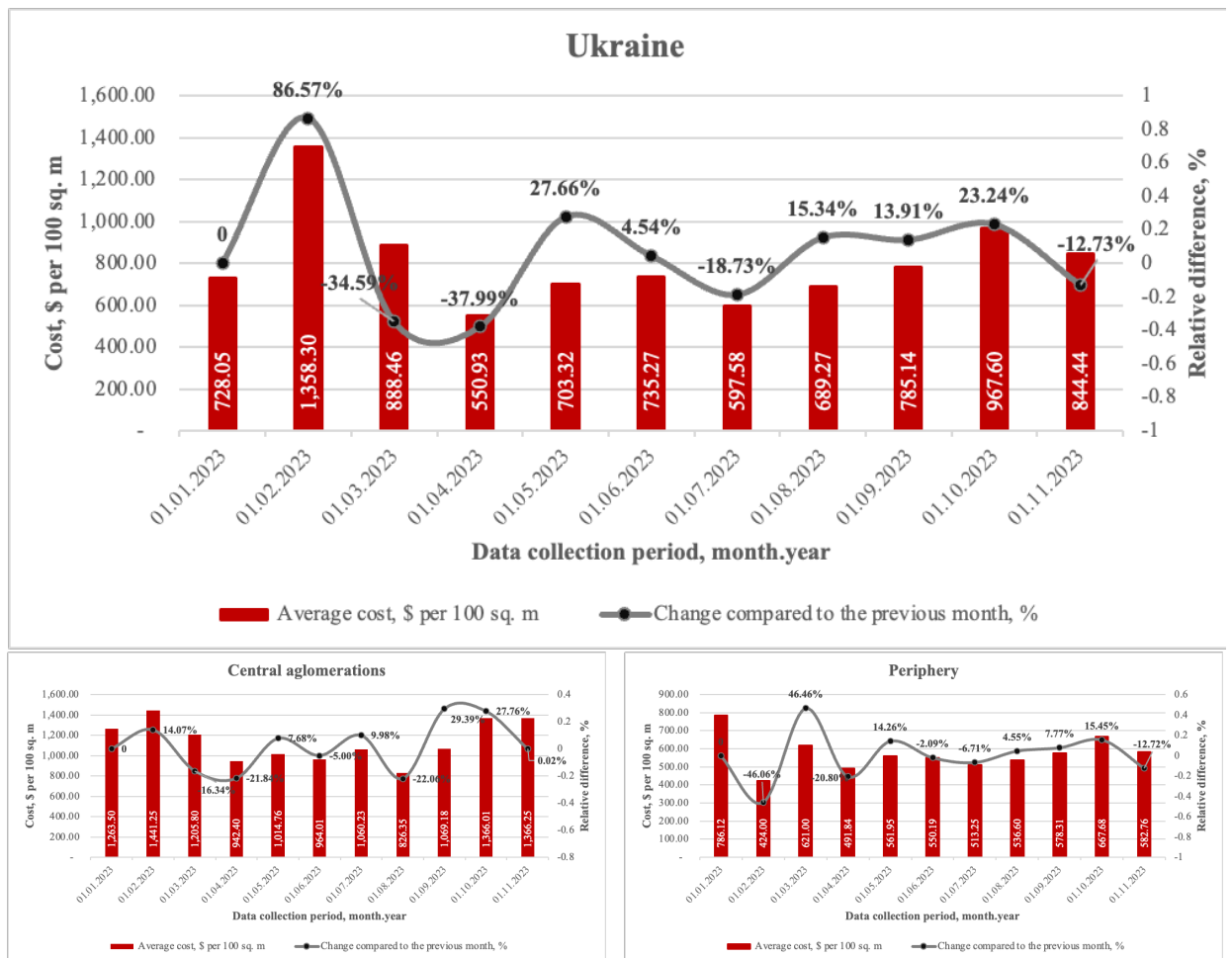


Fig. 2.12. Evolution of changes in the median value of the price per 100 m² of land holdings on the agricultural land market in Ukraine as of December 2023

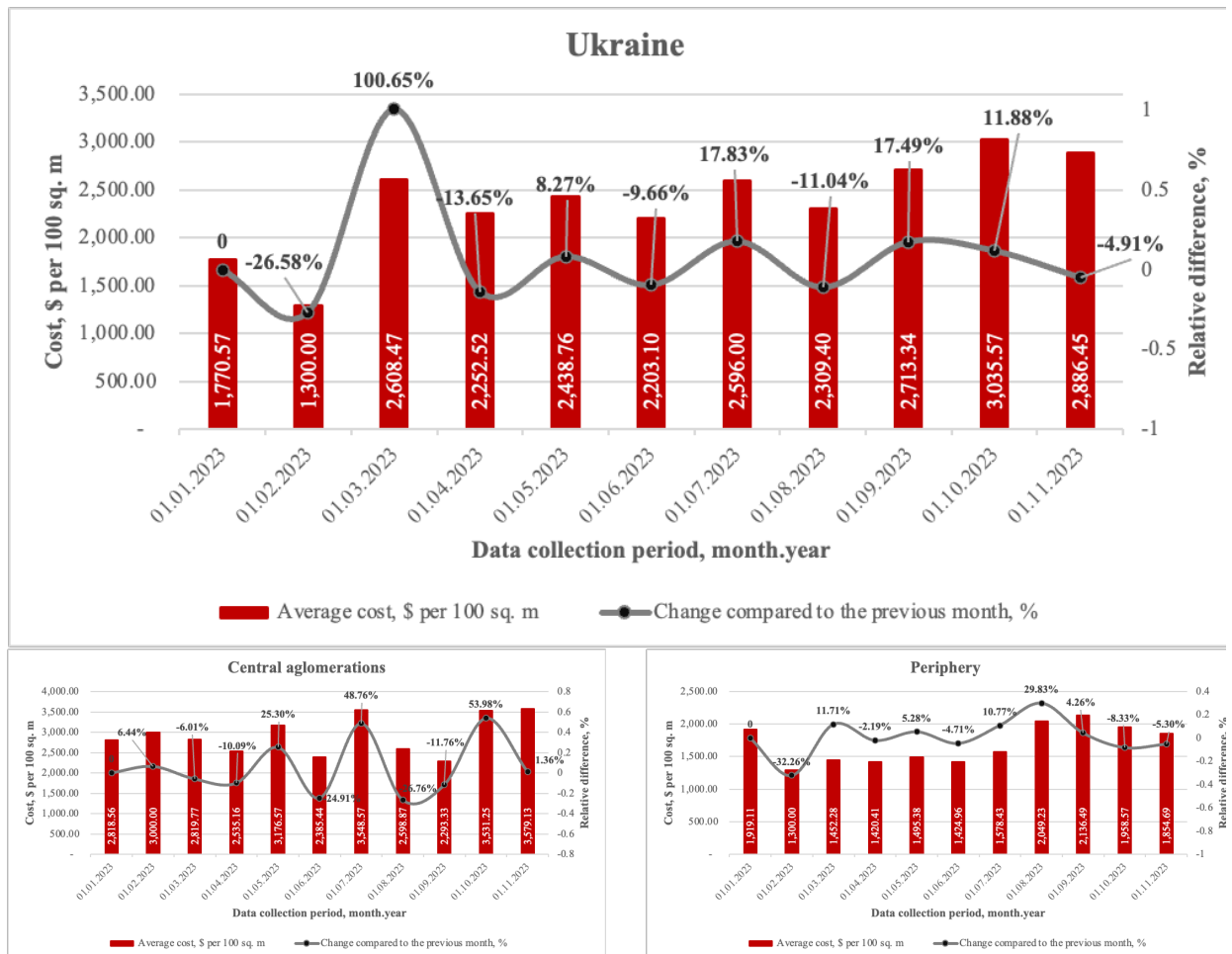


Fig. 2.13. Evolution of changes in the median value of the price per 100 m² of land holdings on the industrial land market in Ukraine as of December 2023

The dynamics of changes in the value of different categories of land plots, taking into account not only the median values of the costs, but also their spread, is shown in Fig. 2.14-2.15.

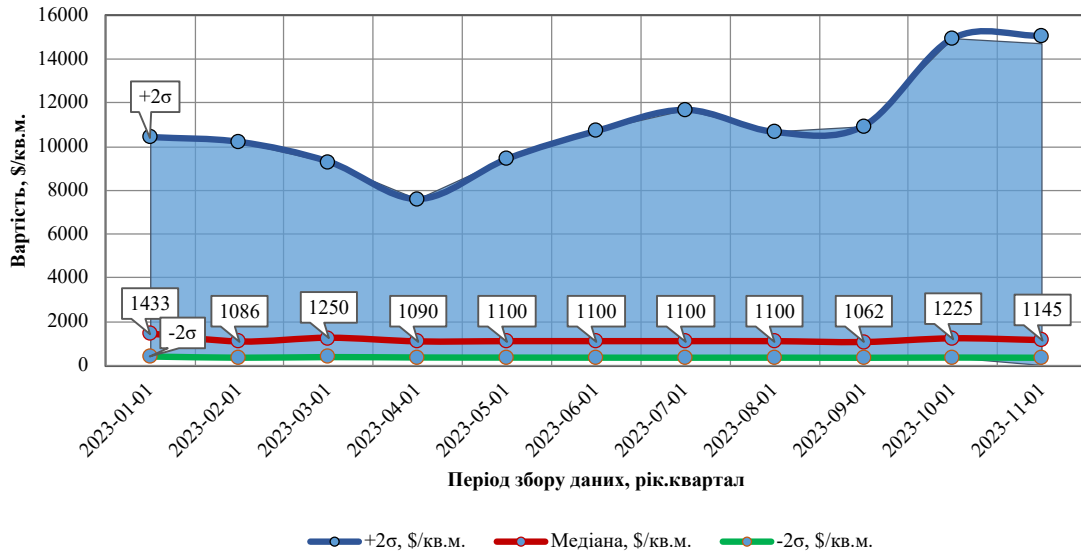
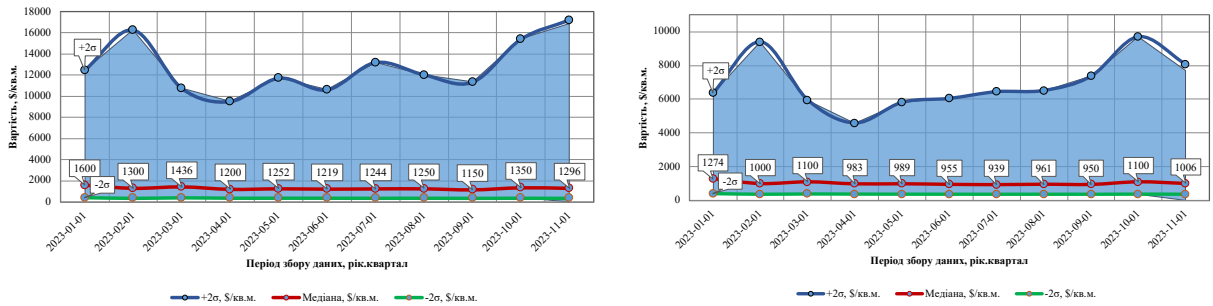


Fig. 2.14. Evolution of the median and marginal (95.46%) levels of the costs of 100 m2 of land plots in Ukraine as of December 2023 (Generalized sample)



Central agglomerations

Periphery

Fig. 2.15. Evolution of the median and marginal (95.46%) levels of the costs of 100 m2 of land plots in Ukraine as of December 2023

The information base of the land market allows for the analysis of the impact of significant price-forming factors. To conduct a comprehensive analysis of the market for land plots in Ukraine, it is essential to determine the median price per square meter depending on the type of soil, location, natural surroundings, and land use method (Table 2.5 – 2.8).

Table 2.5. Parameters of the cost of 100 sq. m of land as of December 2023, depending on the location

Location	Average	Amount of offers	Coef. of variation, %	Median (μ)	Lower confidence limit interval	Upper confidence limit interval
Outside the settlement	1359.85	373.00	1.03	600.00	45.55	7903.47
In the hamlet	1251.65	14.00	0.95	748.75	64.60	8431.86
In the village	1338.30	421.00	0.89	781.25	77.03	7923.28
In the gardening community	1786.87	62.00	0.76	837.12	109.00	6428.87
In the dacha cooperative	1544.18	84.00	0.88	911.46	91.77	9052.52
In the populated area	3110.34	2591.00	0.95	1500.00	131.44	17117.4
In the cottage town	4290.97	333.00	0.94	2300.00	204.30	25893.6

Table 2.6. Parameters of the cost of 100 sq. m of land as of December 2023, depending on the soil

Soil	Average	Amount of offers	Coef. of variation, %	Median (μ)	Lower confidence limit interval	Upper confidence limit interval
Black soil	2494.00	2317.00	1.01	1071.43	84.11	13648.66
Argillaceous	2243.31	229.00	0.81	1321.26	154.14	11325.23
Sandy	3064.83	169.00	1.02	1875.00	144.27	24367.60
Stony	4349.26	544.00	1.04	2100.78	157.13	28086.23

Table 2.7. Parameters of the cost of 100 sq. m of land as of December 2023, depending on the natural environment

Natural environment	Average	Amount of offers	Coef. of variation, %	Median (μ)	Lower confidence limit interval	Upper confidence limit interval
River	1388.29	12129.00	1.15	562.50	34.83	9085.53
Forest	1364.61	15764.00	1.14	571.43	35.74	9135.65
Reservoir	1534.20	1683.00	1.16	599.97	36.19	9945.81
Hills	1361.43	4424.00	1.19	616.06	35.36	10732.95
Lake	1555.58	9525.00	1.13	644.20	41.14	10086.54
Mountains	1376.86	2895.00	1.25	722.22	37.94	13749.51

Islands	2693.86	366.00	1.33	1000.00	46.53	21492.74
Park	2957.68	3649.00	1.36	1017.00	45.35	22808.23
Sea	5067.82	676.00	1.45	2142.86	84.74	54184.87

Table 2.8. Parameters of the cost of 100 sq. m of land as of December 2023, depending on the purpose of use

Purpose	Average	Amount of offers	Coef. of variation, %	Median (μ)	Lower confidence limit interval	Upper confidence limit interval
Cellar	1326.56	2657.00	1.13	500.00	31.92	7832.24
Barn	1508.96	3461.00	1.16	548.85	33.45	9006.17
Outbuildings	2071.24	3500.00	1.26	687.09	35.83	13176.54
House	2162.62	6013.00	1.29	728.88	36.05	14737.28
Foundation	1874.38	3390.00	1.08	800.00	55.25	11584.23
Vegetable garden	1999.76	538.00	0.94	912.88	81.09	10277.23
Orchard	2737.80	520.00	1.02	1204.17	93.45	15515.87
Building materials	3592.73	145.00	1.01	1706.35	133.35	21835.26
Cellar	1326.56	2657.00	1.13	500.00	31.92	7832.24

3. INFORMATION AND ANALYTICAL UNIT OF THE HOUSEHOLD MARKET

As of the end of December 2022, the total information base of the home ownership market is more than 79,000 unique offers. Analyzing the volume of the market, which falls on different categories of rooms, you can see a high financial capacity, which is more than 14.4 billion dollars. USA (Fig. 3.1).

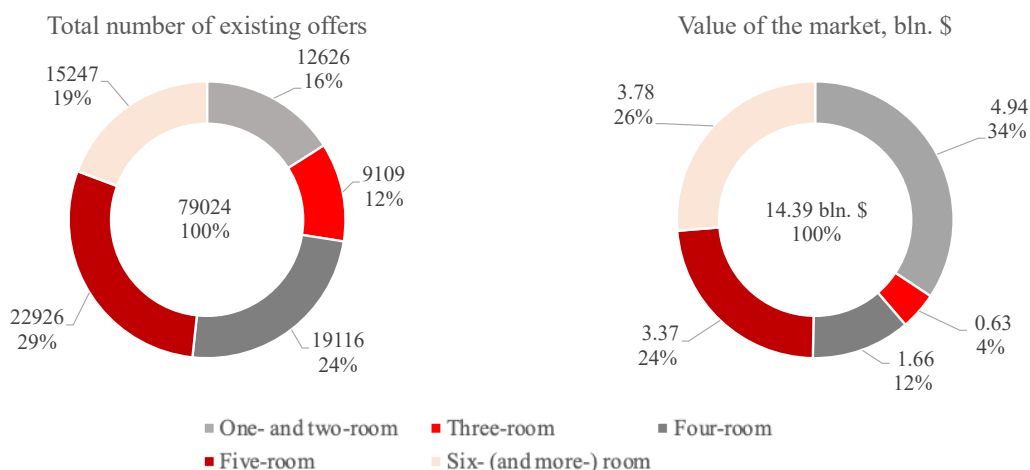


Fig. 3.1. Volume of the household market in Ukraine as of December 2023

The total number of existing property listings for sale in the first half of 2022 was 79,024 houses (Figure 3.1). The majority of listings for sale are four- and five-bedroom houses, accounting for 24% and 29%, respectively, of the total number of houses offered for sale. For one- and two-bedroom as well as six-bedroom listings, this share is also significant, reaching 12% and 19%, respectively. Thus, three-bedroom houses account for 7% of the total number of listings.

In terms of monetary value, the volume of the secondary housing market in Ukraine in December exceeded \$14 billion USD (Figure 3.1). The largest share in this market is held by one- and two-bedroom listings, as well as six-bedroom listings, accounting for 34% and 26%, respectively, while five-bedroom listings make up 24%. The share of four-bedroom apartments in monetary terms already constitutes 12%, and three-bedroom apartments account for 4%.

Market volume indicators in Ukraine for the period 2022-2023 allow for an analysis of how various factors influenced market activity (Figures 3.2, 3.3). There was a decline from the beginning of 2022 due to political and economic instability in the country. Until June 2023, the market situation was relatively stable, and from August onwards, a recovery period began after the shock in 2022. Obviously, the onset of full-scale war was the cause that disrupted the market. Currently, the indicators are still far from the pre-war level, but positive dynamics are present.

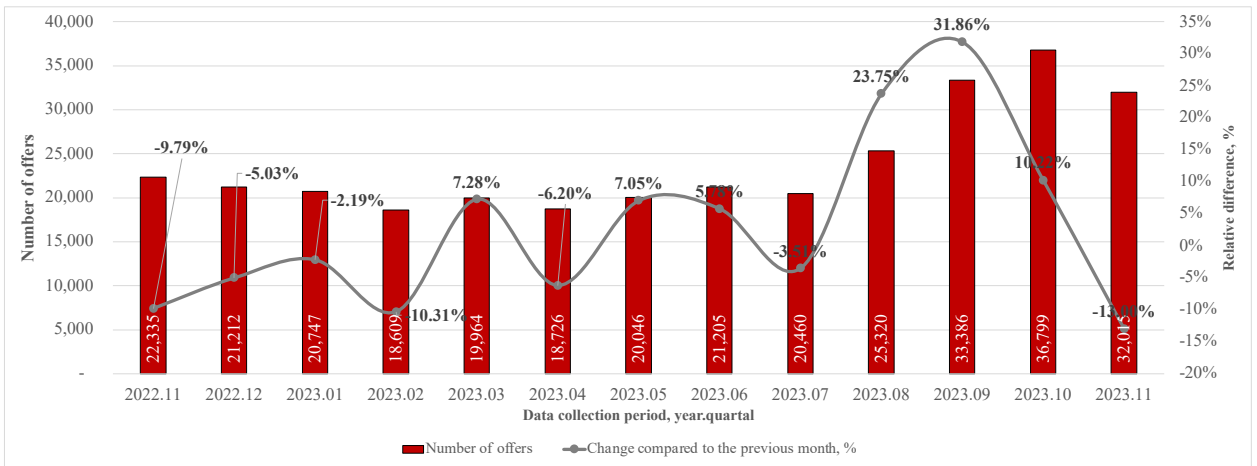


Fig. 3.1. Evolution of the number of offers on the secondary household market in Ukraine, 2022-2023

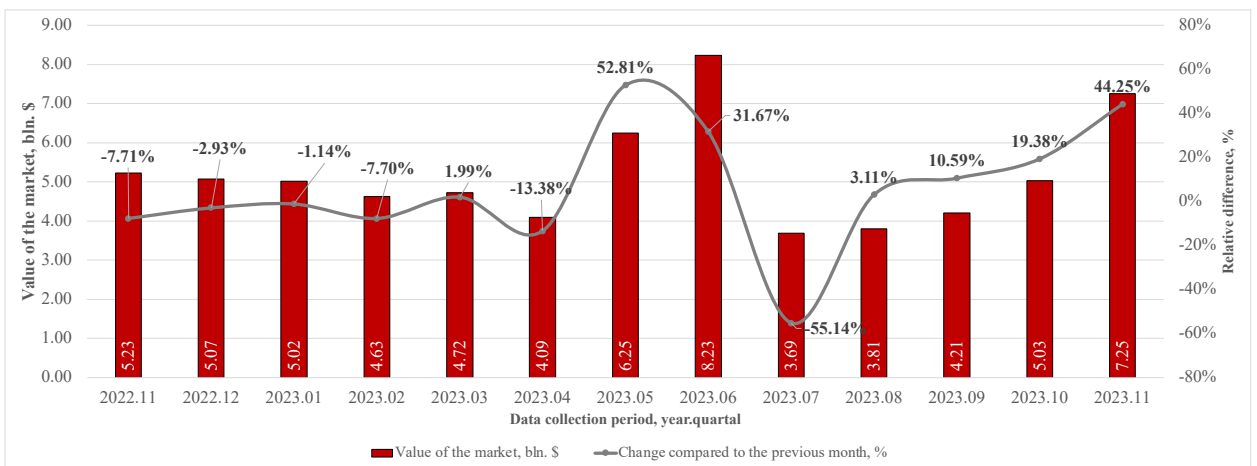


Fig. 3.2. Evolution of the value of the secondary household market in Ukraine, 2022-2023

The conducted statistical analysis, performed using the most powerful significance criteria, demonstrated that the distribution of prices on the housing market is also subject to the log-normal distribution law (Fig. 3.4, 3.5).

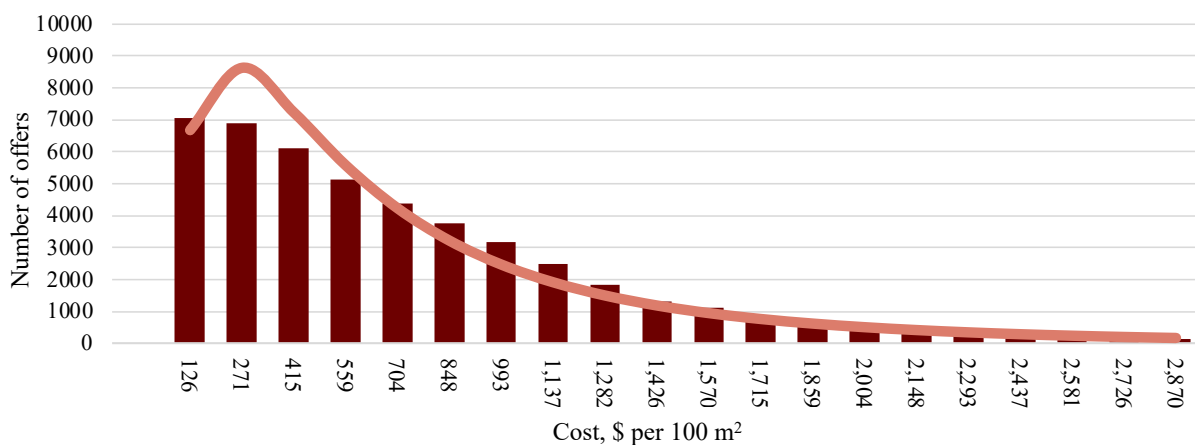


Fig. 3.4. Density distribution cost of 1 m² on the secondary household market of Ukraine as of December 2023

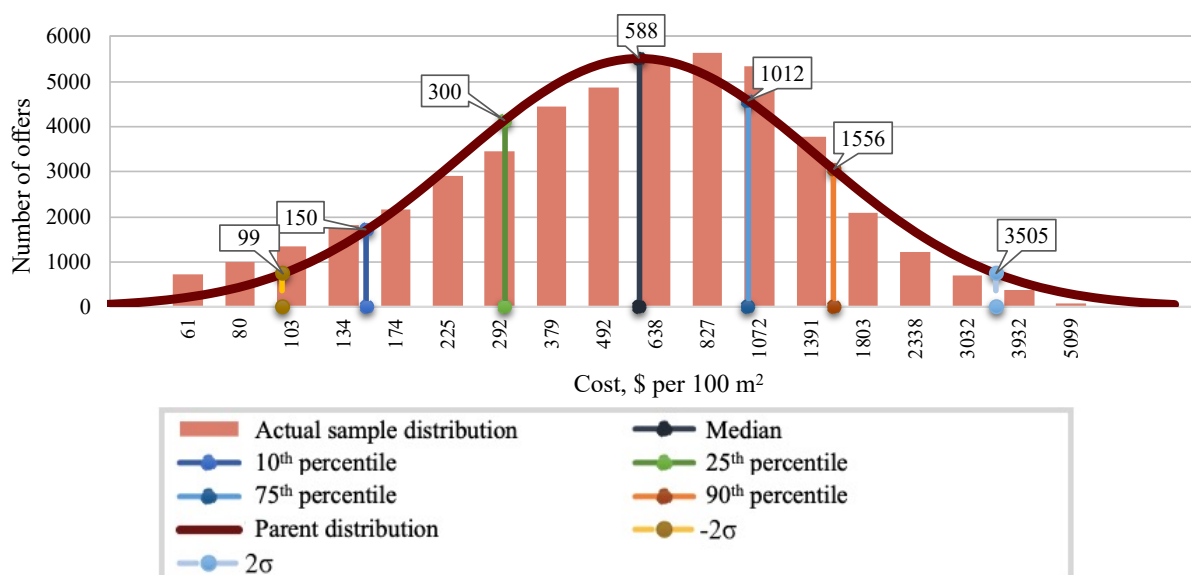


Fig. 3.5. Description of the density distribution of the cost of 1 m² on the secondary household market of Ukraine as of December 2023 according to the log-normal distribution law

Thus, compliance with the log-normal distribution law is confirmed for all considered categories of real estate, including apartments, land plots of any purpose, and home ownership. This opens up the possibility of applying a single methodology for processing the primary information database for these real estate groups.

Below are summarized data on the cost distribution parameters of 1 square meter. of households for all regions without exception, which includes not only the average and median values, but also the level of their dispersion

and variation, which fully describes the probabilistic and statistical parameters of these distributions (Table 3.1).

Table 3.1. Parameters of cost distribution 1 m² of secondary household market in regional centers of Ukraine as of December 2022

Region	Amount of offers	Median (μ)	Average	$S_{lg}(\sigma)$	Coefficient of variations	Lower confidence limit interval	Upper confidence limit interval
Vinnytsia region	358	143.59	215.41	0.35	0.57	28.81	715.80
	626	593.32	619.70	0.36	0.60	110.85	3175.65
Volyn region	149	166.67	231.62	0.34	0.54	35.55	781.37
	197	487.50	562.87	0.31	0.49	118.43	2006.77
Dnipropetrovsk region	662	237.80	417.96	0.43	0.73	32.90	1718.62
	1574	429.52	554.00	0.33	0.54	92.57	1993.02
Donetsk region	20	110.55	267.38	0.48	0.84	12.02	1016.91
	193	200.00	258.86	0.30	0.48	50.43	793.10
Zhytomyr region	355	136.36	198.09	0.34	0.55	28.99	641.44
	393	363.64	477.60	0.37	0.62	64.86	2038.66
Transcarpathian region	275	307.69	393.68	0.26	0.40	94.87	997.96
	595	609.09	671.18	0.27	0.42	179.49	2066.92
Zaporizhzhia region	84	243.88	292.71	0.28	0.44	68.51	868.19
	280	455.84	506.19	0.24	0.38	149.36	1391.21
Ivano-Frankivsk region	249	271.97	335.19	0.27	0.42	79.27	933.08
	473	455.56	561.29	0.30	0.49	112.19	1849.89
Kyiv region	3222	776.78	980.69	0.36	0.59	149.47	4036.98
	2728	883.93	993.29	0.28	0.45	238.30	3278.77
Kirovohrad region	172	114.29	154.23	0.33	0.54	24.74	528.00
	430	340.00	426.03	0.36	0.59	65.24	1771.93
Lviv region	498	275.18	388.43	0.34	0.56	56.62	1337.48
	754	484.38	624.38	0.34	0.56	100.16	2342.40
Mykolaiv region	180	161.59	211.85	0.32	0.52	36.93	707.00
	188	293.92	355.99	0.32	0.52	67.18	1285.97
Odesa region	741	346.53	419.42	0.32	0.51	80.85	1485.34
	2076	793.88	967.20	0.32	0.52	180.00	3501.34
Poltava region	490	142.45	201.71	0.33	0.54	30.69	661.28
	624	387.99	499.03	0.33	0.53	85.47	1761.30
Rivne region	206	177.57	244.17	0.33	0.53	39.22	803.94
	330	489.47	557.60	0.31	0.50	116.83	2050.72
Sumy region	140	89.91	130.46	0.33	0.54	19.52	414.09
	293	250.00	333.40	0.36	0.59	48.10	1299.37
Ternopil region	191	135.87	182.69	0.29	0.46	35.56	519.19
	279	328.95	384.35	0.30	0.48	81.75	1323.60
Kharkiv region	477	224.49	299.98	0.32	0.51	51.75	973.78
	662	428.57	535.56	0.34	0.55	90.38	2032.33
Kherson region	23	155.00	215.45	0.37	0.61	28.30	848.97

	9	544.12	481.34	0.21	0.32	208.42	1420.55
Khmelnyskyi region	240	138.32	190.90	0.32	0.52	31.16	614.00
	465	422.41	496.83	0.31	0.50	99.45	1794.11
Cherkasy region	545	121.43	174.30	0.34	0.55	25.22	584.63
	455	245.10	368.68	0.37	0.61	44.92	1337.35
Chernivtsi region	189	240.00	304.13	0.30	0.49	59.13	974.14
	329	561.22	651.40	0.30	0.47	143.64	2192.77
Chernihiv region	380	100.00	135.82	0.31	0.50	23.99	416.86
	282	229.97	296.38	0.32	0.51	53.07	996.59
Luhansk region	51	436.36	474.66	0.28	0.44	121.32	1569.42



In addition to this general picture, the information base of the land market allows for the analysis of the impact on the value of the most important price-forming factors. To carry out a comprehensive analysis of the home ownership market in Ukraine, it is necessary to determine the median price per square meter depending on the type of home ownership and location (Table 3.2).

Table 3.2. Dependence of the median cost on the category of home ownership

Sample	Type of home ownership	Distance to the nearest city	Median cost, \$/m ²	Absolute difference from the baseline, \$/m ²	Relative difference from baseline, %
Whole Ukraine	House	All	309.52	-	-
		From 10 to 50 km	154.71	-154.81	-0.50
		Up to 10 km	747.34	437.82	1.41
	Cottage	All	382.35	-	-
		From 10 to 50 km	498.39	116.04	0.30
		Up to 10 km	382.35	0.00	0.00
Central agglomerations	House	All	487.68	-	-
		From 10 to 50 km	333.33	-154.35	-0.32
		Up to 10 km	592.59	104.91	0.22
	Cottage	All	230.77	-	-
		From 10 to 50 km	212.48	-18.29	-0.08

		Up to 10 km	250.00	19.23	0.08
Periphery	House	All	214.29	-	-
		From 10 to 50 km	133.33	-80.96	-0.38
		Up to 10 km	287.04	72.75	0.34
	Cottage	All	144.45	-	-
		From 10 to 50 km	123.33	-21.12	-0.15
		Up to 10 km	171.23	26.78	0.19

The dependence of the cost of 1 square meter of home ownership on the total area and agricultural plots is shown in fig. 3.6 - 3.7.

The resulting quantitative equations, which provide an approximation of these empirical dependencies, make it possible to use them to make a direct adjustment when comparing the value of analogues and evaluation objects existing on the market.

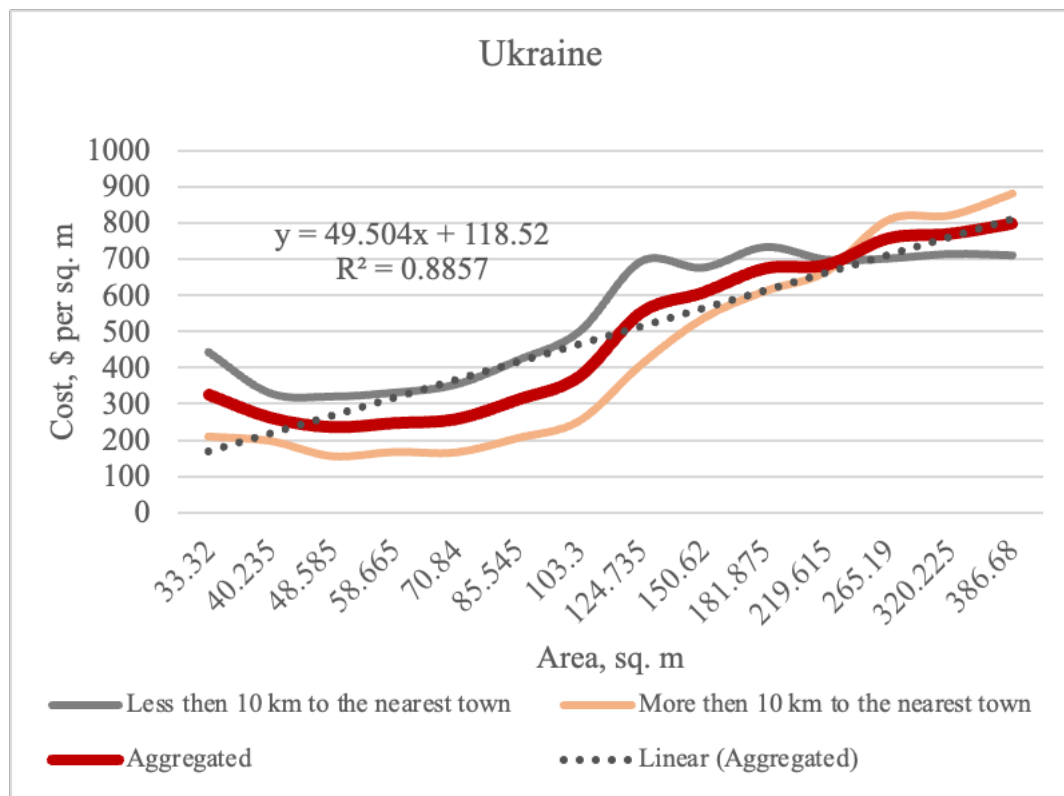
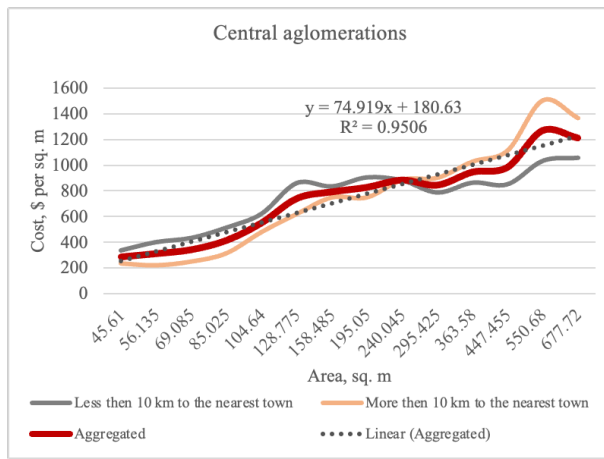
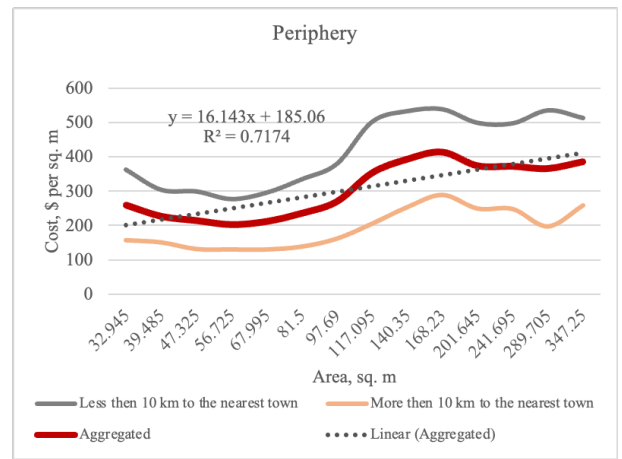


Fig. 3.6. Dependence of the cost of 1 sq. m of households from their total area (all of Ukraine)



Central agglomerations



Peryphery

Fig. 3.7. Dependence of the cost of 1 sq. m of households from their total area (depending on the location)