

## THE ISSUES OF THE SUBSTANTIATION OF PEER AGRICULTURAL LAND PLOTS EXCHANGE IN UKRAINE

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### Abstract

*The study is dedicated to the substantiation of peer land plots exchange in the course of land consolidation. The issue of the allowable difference of the values of land plots, considered to be peer, has been examined. The legally established 10 % allowable difference has been scrutinized. The evaluation of value difference ranges of land plots, considered to be peer, has been carried out. The formation of land plot value at peer exchange in Ukraine has been analysed. It has been revealed, that due to the vague definition of the allowable difference of land plot values and poorly elaborated evaluation, there arises an uncertainty of 1/110 ( $\approx 0.9\%$ ) to 13/220 ( $\approx 5.9\%$ ) of the land plot value. It complicates the voluntary involvement of landowners to land reallocation and potentially leads to disputing the peer land exchange in the court. With the example of an interspersed land plot within a land mass in Cherkasy Region, potential loss due to inaccurate demands to the valuation of land plots to be exchanged and poorly elaborated valuation methodology, has been calculated. An approach to the specification of the affordable land plot value range which excludes uncertainties has been suggested. The results can be used for the improvement of land reallocation modeling based on heuristic and optimization methods.*

**Key words:** land exchange, land reallocation, peer land plots, land consolidation

### INTRODUCTION

Land plot exchange is the key tool for both individual and comprehensive land consolidation [20, 17], and land reallocation [5, 8]. The advantages of the peer land exchange are manifold possibilities for the improvement of spatial land plot characteristics without the need for buying out the land plots or their shares, and minimal losses for landowners involved in the project [18]. It is of key importance in terms of compensation [9], especially at compulsory land consolidation, landtake for community needs [21], especially in cases the exchange is carried out by the court judgement, not by the mutual consent [7].

The key stage of exchange is (for example, in accordance with Land Exchange Decision Document) [2] the substantiation of the peeriness of land plots to be exchanged [15], especially in case the exchange is carried out for the public benefit [4].

Fair exchange is the key incentive for land owners to get involved into the process of reallocation.

The poorly substantiated peeriness of land plots to be exchanged can become a hurdle for land consolidation [16]. It is a precondition for suspicion to the project, and, as the result, social tension arises, and the implementation of reallocation measures is slow, especially, when there is a big number of land plot exchange options [10].

In the ideal case, the exchange can be considered peer provided the values of land plots to be exchanged are equal. Land plot reallocation modeling practices predefine the allowable 10% range of the land plot value difference [14]. In Ukraine, at land consolidation, land plots are considered to be peer when their normative monetary values are either equal or the difference of their values is no more than 10% [22, 23].

The working hypothesis is that the approach according to which the value difference of

peer land plots should be no more than 10%, does not set the value difference range conclusively. Further, it creates preconditions for disputing the exchange and finding it not peer.

The goal of this article is the issue of the substantiation of land plots as peer ones based on the calculation of the allowable difference of their value.

## MATERIALS AND METHODS

Demetriou [6] suggests that the determination of value of land plots in the course of land consolidation can be carried out based on either market price or value, calculated considering a set of coefficients characterizing soil quality and productivity, expressed in numerical score.

In Ukraine, there is a methodology of exchange based on the land plot value calculated by normative monetary valuation [18], which is defined by the following formula for agricultural land:

$$V_i = S_i N K_{Pi} K_{Li} \frac{B_i}{B_{Mi}} \quad (1)$$

$V$  = the value of the land plot by normative monetary valuation;

$S_i$  = the area of the land plot, square metres;

$N$  = capitalized rental income from a unit of area (calculated by methodology [3], is equal to 27,520 UAH per ha (\$96.61 /1,000 sq.m));

$K_{Pi}$  = the coefficient of land plot designated use ( $K_{Pi}=1$  for all agricultural land plots (including land plots occupied by field-protecting forest belts), excluding land plots for markets ( $K_{Pi} =2.5$ ), for research and training ( $K_{Pi} =0.7$ ), for the conservation and use of nature reserve fund areas, public hayfields and pastures ( $K_{Pi}=0.5$ ), not owned or used land plots, including those occupied by agricultural facilities and farmsteads ( $K_{Pi} =0.1$ ));

$K_{Li}$  = the coefficient of the placement of the territorial community within the natural and agricultural region. Its value is preset by the methodology (0.276 to 1.593 for arable land; 0.156 to 3.266 for perennial plantings; 0.079

to 0.51 for hayfields; 0.035 to 0.325 for pastures);

$B_i$  = the ball bonitet of the soil suitability group of a certain natural and agricultural area;

$B_{Mi}$  = the mean ball bonitet of the soil of respective cultivated land of a certain natural and agricultural area.

The average value by normative monetary valuation ranges depending on the region of Ukraine from 33,646 UAH/1,000sq.m. (\$125.14/1,000 sq.m.) to 21,411 UAH/1,000sq.m. (\$79.63/1,000 sq.m.) (Fig. 1).

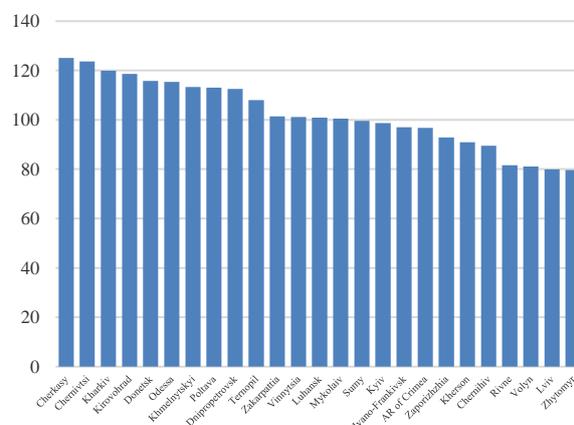


Fig. 1. Arable land normative monetary value by the region of Ukraine, \$/1,000 sq.m.  
 Source: [19].

In the most widespread cases, land plot exchange is executed to spatially optimize land masses [11].

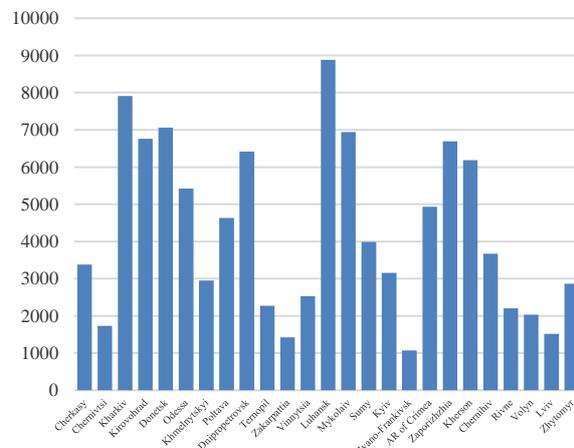


Fig. 2. Average normative monetary valuation of arable land plots (land shares) in the regions of Ukraine, \$  
 Source: Own calculation based on [19].

Usually, strip farming arises within land masses formed with land shares, the demarcated afield. Normative monetary valuation of such land plots varies depending on the region from 28,695.70 UAH (\$1,067.28) to 238,700.00UAH (\$8,878.00) in average (Fig. 2).

According to formula (1), if land plots of the same type (e.g. arable land) are peerly exchanged within a territorial community, land plots will have the same value by normative monetary valuation in case:

$$S_i \times B_i = S_j \times B_j$$

where:

$S$  = the area of the land plot;

$B$  = the ball bonitet of the soil of the land plot.

Land plots are considered to be peer when the inequation is fulfilled:

$$S_i \times B_i - S_j \times B_j \leq \pm \Delta$$

where:

$\Delta$  = the extreme acceptable value of the difference of land plot values by normative monetary valuation.

The effective legislation of Ukraine defines  $\Delta$  to be equal to 10% without extra clarification, 10% from which land plot value (higher value, lower value, mean value) should be taken. Let us examine if such a vague formulation influences the range of the allowable value difference of land plots which are considered to be peer.

Generally, the demand on the difference of values of land plots, which are considered to be peer, is interpreted as follows. At the selection of a peer land plot, its possible value  $V_j$  is defined. In order to do it, we calculate 10% from the value  $V_i$  of the initial land plot. Thus, the value of a peer land plot should be in the range of  $0.9V_i$  to  $1.1V_i$ , i.e., is defined by inequation:

$$\frac{9}{10}V_i \leq V_j \leq \frac{11}{10}V_i \quad (2)$$

Let us scrutinize the regulation on the value difference and assess if it is reasonable to apply formula (2) to all cases.

Let us address two land plots to be exchanged with values  $V_i$  and  $V_j$ . The value of a land plot is naturally higher than 0. Since there are no extra conditions, let us examine the case the values of land plots to be exchanged differ more than by 10%, irrespective of that, which land plot has less value. I.e.:

$$\begin{cases} |V_i - V_j| \leq 0.1V_i \\ |V_i - V_j| \leq 0.1V_j \end{cases} \Leftrightarrow \begin{cases} V_i \geq V_j \\ V_i \leq \frac{11}{10}V_j \\ V_i \leq \frac{10}{9}V_j \\ V_i < V_j \\ V_i \leq \frac{10}{11}V_j \\ V_i \leq \frac{9}{10}V_j \end{cases} \Leftrightarrow \begin{cases} V_i \leq \frac{11}{10}V_j \\ V_i \geq \frac{10}{11}V_j \end{cases} \quad (3)$$

Then, the range of difference of peer land plots values, which complies with the inequation (3), is depicted in Fig. 3.

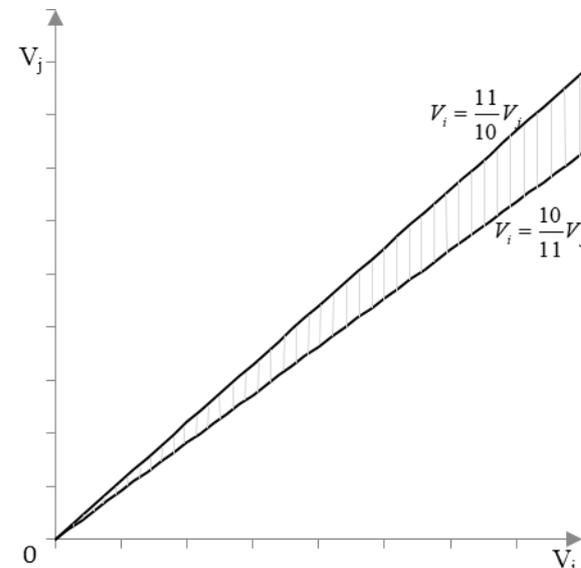


Fig.3. Range of difference of land plots values, which are considered to be peer

Source: Own calculation.

Generally, according to the inequation (3), for the given land plot with the value  $V_j$ , we can define the value  $V_i$  of a land plot, which can be considered to be peer:

$$\frac{10}{11}V_j \leq V_i \leq \frac{11}{10}V_j \quad (4)$$

As we can see from formula (2) and (4), the difference of extreme values of the land plot is 1/110 of the value of the land plot by normative monetary valuation.

## RESULTS AND DISCUSSIONS

The calculations prove, the existing interpretation of the peeriness of land plots causes an inaccuracy of 1/110 from the value of the land plot by normative monetary valuation. Thus, the selection of peer land plots according to the effective legislation can cause disputing the land plots exchange and finding it not peer. The inaccuracy for typical land plots across the regions of Ukraine is \$9.70 to \$80.81 (Fig. 2) (Fig. 4).

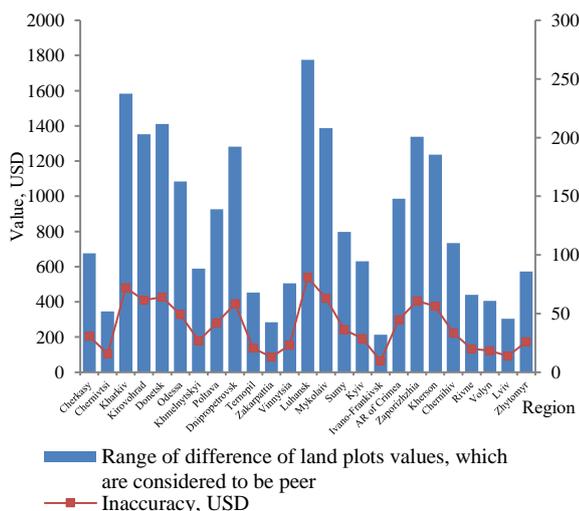


Fig. 4. Inaccuracy of range of difference of land plots values, which are considered to be peer  
 Source: Own calculation.

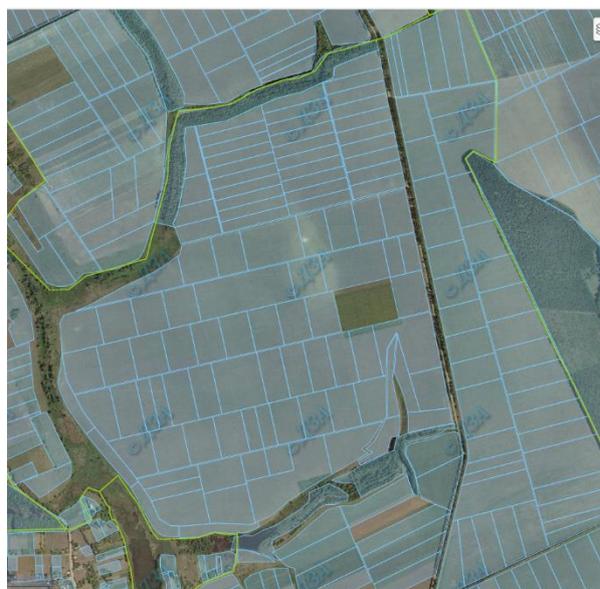
Let us examine an interspersed land plot with the area of 64,682 sq.m. in an agricultural land mass (Map 1 and 2) in Cherkasy Region, Ukraine.

Normative monetary value of such a land plot is 217,654.93 UAH (\$7,641.14).

According to general approach, in order to optimize the land mass [12], the exchange of the interspersed land plot with a peer land plot at the edge of the land mass is predefined. Let us calculate the value of a peer land plot for exchange.



Map 1. Interspersed land plot within a land mass  
 Source: space image from the Public Cadastral Map of Ukraine.



Map 2. Interspersed land plot within a land mass  
 Source: The Public Cadastral Map of Ukraine.

In case we calculate the value of a peer land plot based on the value of the interspersed land plot, by normative monetary valuation it can be 195,889.44 UAH (\$6,877.03) to 239,420.42 UAH (\$8,405.24). Formula (4) proves, the minimal value of a land plot which can be considered as a peer one, is 197,868.12 UAH (\$6,946.49). In case the owner gets a land plot with the normative monetary value from 195,889.44 UAH to 197,868.12 UAH for their land plot, such exchange can be disputed and considered to be not peer. Thus,

the landowner can lose 1,978.68 UAH (\$69.46) by normative monetary valuation. Landowner's potential loss by market valuation is 3,592.20 UAH (\$126.11), loss of area is 588 sq. m.

The application of normative monetary valuation is controversial per se [13], because the normative valuation does not take into consideration a number of other factors, important for land consolidation (land plot configuration, relief and placement within the land mass, distance to inhabited localities, and engineering and transport infrastructure) [1].

According to expert estimates, the market value of an irregular shape land plot other than rectangle or rectangular trapezoid or a land plot with complicated relief, is decreased by 5%. In case the land plot is exchanged with a land plot of the irregular shape or complicated relief, the landowner can lose as much as 39,155.01 UAH (\$1,374.60) by market valuation, i.e., the inaccuracy is 13/220 of value.

## CONCLUSIONS

The effectiveness of reallocation depends on the degree to which the peer land plot exchange is substantiated. The absence of clear regulations on the difference of values for land plots, which are considered to be peer, impedes the implementation of land tenure optimisation measures, especially, at the stage of peer exchange approval or exchange as the execution of court judgment. It has been demonstrated, that the existing interpretation of the peeriness of land plots causes an inaccuracy of 1/110 ( $\approx 0.9\%$ ) to 13/220 ( $\approx 5.9\%$ ) from the value of the land plot. It has been suggested to consider the exchange to be peer if land plots to be exchanged differ by 10% from the less value of those of land plots being exchanged. Based on the research, it is suggested to adjust the effective legislation of Ukraine. At exchange, it is reasonable to consider the value calculated by the expert monetary valuation, or relative value which considers the spatial characteristics of land plots, especially configuration and relief.

The results can be used to define the peeriness of land plots by various valuations, especially, by relative value, and market value [6]. The results can be used at land reallocation modeling based on heuristic and optimizational approaches.

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