SUSTAINABLE DEVELOPMENT FACETS: FARMLAND MARKET DEMAND ESTIMATION

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Abstract. Present research is developed in light of the farmland market establishment in Ukraine. Agriculture is one of the key sectors of national economy, which determine its development. Thus, the farmland users determine the transition of the national economy to sustainable development. The purpose of this paper is in developing a methodology for quantitative assessment demand quantity and price on farmland market in Ukraine. In the present research, we propose a methodology for estimating demand on agricultural land in Ukraine based on the operational data of the corporate agricultural producers and macroeconomic situation in the country. Using the discounted profit margins for the corporate agricultural producers, which operated in Ukraine in 2015, we estimate land price and demand quantity that is conditional on profitability of agricultural production towards to sustainability. As a result, we find that after establishing the land market in Ukraine, demand on the agricultural farmland is expected to be significant and is likely to generate substantial capital flows towards landowners. In addition, existence of the transferable land-property lights will make the land available for the collateral purposes. That is expected to enable Ukrainian corporate and private agricultural of any size to the improved access to capital. Specifically, this paper is amount the first one, where demand prices on the possible land market in Ukraine are estimated. Opening one third of the arable land area to the market (sample of the corporate agricultural producers covered by the research due to the data related limitations), agriculture may benefit with 30 to 50 billion euros of the capital investments.

Keywords: land market, demand for land, land price, interest rate, corporate farms, corporate agricultural enterprises, sustainability

1. Introduction: problem setting

Development mode of such important sector as agriculture is affects sustainable development processes at any country (Dobrovolskienė et al. 2017; Tvaronavičienė, Gatautis 2017; Pietrzak et al. 2017; Ryabchenko et al. 2017; Svetlanská et al. 2017; Sulphey, M. M. 2017). Great variety of the organizational and legal forms of the corporate agribusiness existing in Ukraine creates misleading illusion of the significant difference in their productivity (Skrypnyk et al. 2016). Currently, Ukrainian government is neutral to all existing entrepreneurship forms in corporate agricultural production, mainly because theirs diversity corresponds to the protracted transition period from the planned economy to the market. Despite obvious incompleteness of the institutional reforms, Ukrainian agriculture has stable development patterns, guaranteeing high levels of exports, significant

share in Gross Domestic Product (GDP) and constant demand on rural labor and agrarian services.

With the overall development of the country, the share of agricultural GDP declines. This was a development trajectory of many developed countries and specifically the EU, where share of agricultural GDP declined to below 1.5% (The World Bank 2015). Ukraine belongs to the group of "lower middle income countries" (according to the annual income per person (United Nation 2017)), with the average share of agricultural GDP about 16.6% and its declining tendency (United Nation 2017). Given that, it is likely to make a misleading assumption that development of the sector with a declining contribution to the GDP is against national interests. Agriculture of any country has a limited expansion potential constrained by the arable land area, existing technologies and climate. Therefore, it demonstrates moderate growth rates compared to the other sectors such as services and industry. However, agriculture is an essential component of a country development because it accommodates large part of labor, and significantly affects welfare of rural population (Skrypnyk & Zinchuk 2012). Assuming, that Ukrainian agriculture will have a very limited state support in form of subsidies, it is important to understand economic productivity of different organizational and legal forms of the corporate agricultural production existing in present institutional environment.

Such farm specific indicators of economic performance as profit, profitability and risks are of importance for a successful implementation of the agricultural land market in Ukraine. Since the beginning right after the decay of USSR, land reform was never completed and the agricultural land market implementation may finally conclude slothful transition period. Assuming that policymakers' objective is in the rural areas' development, instead of simply increasing production of agricultural commodities, available data allows to classify and distinguish all existing organizational and legal forms of the corporate agribusiness and find those that maximize such policy objective. In addition, such research may find most effective and profitable forms of corporate agribusiness that could become a cornerstone of further rural development and implementation of the agricultural land market.

The goal of the present research is in understanding economic performance of the existing organizational and legal forms in the corporate agricultural business in Ukrainian and in evaluating the effect of these indicators on expected demand on land on the potential agricultural land market. In addition, present research suggests methodology for empirical estimation of land demand price and quantity, by modelling land demand based on the farm specific economic performance indicators. Present research is structured in the following way. Section 1 provides a brief literature overview of studies on the corporate agribusiness in Ukraine and agricultural land market issues. Section 2 briefly describes data and associated limitations. Section 3 summaries quantitative indicators of the corporate agribusiness in Ukraine. Section 4 brings light on the methodology of the land demand estimation and presents main empirical findings. Section 5 is a conclusive one, where the main findings are discussed.

2. Literature review

Analyzing official statistical reports of the Ukrainian farms, authors concluded (Skrypnyk et al. 2016), that existing statistics do not allow drawing strong and statistically justifiable conclusions about advantages of specific organizational and legal forms of agribusiness. Noticeable however, is low economic efficiency of the state-owned farms, who tend to reduce arable land area, choosing the riskless rent driven strategy of agribusiness (Kvasha et al. 2015). In addition, the fact, that the main agricultural resource such as land belongs to the Pareto distribution, indicates incompleteness of the institutional reforms. Therefore, after implementing land market in Ukraine, defining optimal size, organizational and legal form of farms may occur based on the conditions of the land market and institutional environment reflected in the long-term taxations and support strategies (Skrypnyk et al. 2016).

Longlisting debate about efficiently advantage of the large-scale farms in front of the small-scale farms is supported by the rather opposite proof, where researchers are finding no scale efficiency in agriculture (Swinnen et al. 2005; Swinnen & Vranken 2009; Peterson 1997; Deininger et al. 2013). The World Bank research showed

that the importance of scale in the farms efficiency in Ukraine is largely overvalued. Improvement of the average industrial efficiency occurs mainly due to the bankruptcy and exit of the less efficient farms (Deininger et al. 2013). In lite of the high bankruptcy and exit rates among farms, ability to transfer land from one individual to another is of importance for the agribusiness. With the open land market, land becomes a subject for collateral and insurance, enabling agricultural to the grater capital intensification.

Regarding to the prospects of the land market implementation in Ukraine, there is a number of academic opinions voiced on this subject (Kvasha et al. 2015; Skrypnyk et al. 2016; Swinnen et al. 2008; Lerman et al. 1995; Lerman 2007; Lerman et al. 2002). One of those suggests that state-owned farms could make a first step by forming initial supply of the land on the market (Kvasha et al. 2015; Shpychak & Bodnar 2012). Given that such could be an initial land supply without any historical information on the land prices, the price of land cannot be determined by the market. Instead, suppliers may propose own land prices based on the profitability of the most efficient enterprises in the long-term perspective (Kvasha et al. 2015; Shpychak 2015). The study on the technical efficiency the farms specialized on the wheat production in Ukraine shows substantial potential of unoccupied land available for the land market. In particular, bridging the efficiency gap between inefficient and the most efficient enterprises might "free" up to one third of the utilized arable land are without losing production levels (Skrypnyk & Bukin 2016, pp.145–148; Skrypnyk et al. 2017). Such land will have to be redistributed and find another utilization, which cold only be possible with the functioning land market. Estimates of the potential contribution of Ukraine to the global commodities production supports this idea about big unutilized production reserves (Skrypnyk & Starichenko 2017), which might significantly exceed food security needs of the country (Shpychak 2015).

3. Data description

We base our empirical analysis on the standardized statistical data about the results of the economic activities of the corporate agricultural producers operating in Ukraine. The State Statistics Service of Ukraine (SSSU) annually collects this data using standardized questionnaire – "Form 50-SG" (SSSU 2017). Annual sample covers all corporate agricultural producers (both livestock and cash crops producers) that qualify with certain size criteria: (1) more than 50 ha of arable land or (2) gross profit of more than 150 thousand of Ukrainian Hryvna (UAH) per year (1 UAH was approximately 0.037 USD in 2017). Therefore, sample used in the analysis covers more than a half of all arable land in Ukraine and approximately the same share of agricultural production. Another half of arable land and production is not covered in the research because such data is not collected regularly by the SSSU. Among not covered agricultural producers there are other forms of agribusiness such as very small corporate agricultural producers, private entrepreneurships, and peasant farms – households.

Due to the privacy protection issue, each producer specific data is anonymized, thus it is not possible to track the same company over time or identify its exact location. We also use data for two separate years: 2009 and 2015. Geographical coverage of data is different in 2015 compare to 2009 because data collected in 2015 does not cover temporarily occupied territories of the Autonomous Republic of Crimea and Sebastopol city as well as the territories, where the anti-terrorists operation on the East of Ukraine is held.

Given that all calculation are made per 1 ha of arable land, the initial sample was narrowed to only those enterprises that that produce crops and utilize at least 1 ha of land. In addition, we cleaned the sample from the outliers. As outlining, we defined those farms, where income per 1 ha of arable land deviates from the sample mean of income per 1 ha of land for more than tree standard deviations. In addition, data distinguishes more than 20 categories of organizational and legal form of corporate agribusiness. In order to create a meaningful picture, we grouped all forms into three groups of enterprises with similar structural and legal features: corporate farms, state-owned enterprises and other corporate enterprises (which includes private companies, joint-stock enterprises, partnerships, cooperatives, holdings, unions and other organizational and legal forms (Skrypnyk et al. 2016). Worth noticing is that corporate farms (thereafter farms) are different from the peasant farms, which are household based agricultural producers. The last group of other corporate agricultural enterprises makes a dominating majority of the sample. Hereafter, we refer to this group as to the agricultural enterprises.

4. Description of the agribusiness in Ukraine

Profit per 1 ha of arable land is utilized as an indicator of performance of the corporate agribusiness analyzed in this paper. From the distribution of this indicator estimates of the demand on the potential land market are derived. In particular, we use discounted profit per 1 ha of arable land as an approximation of the land price (Shpychak & Bodnar 2012; Kvasha et al. 2015). Profit per 1 ha is recoded in the national currency – Ukrainian Hryvna (UAH). This currency significantly devaluated in 2015 compare to 2009, therefore, we convert all values that are recorded in 2009 prices to the 2015 prices by multiplying prices of 2009 with the integral agricultural commodities prices index calculated by the SSSU (SSSU 2017). In practice, this means that all values that had been expressed in 2009 UAH were multiplied by 3.7 for converting them to the 2015 prices. Anywhere below, when it is referred to the UAH currency, it is expressed in 2015 prices. For convenience, UAH currency is also converted to EURO using the average exchange rate for 2015, that is approximately 30 UAH per 1 EURO. General description of the operational characteristics of the agricultural enterprises with different organizational and legal forms in 2009 and 2015 is presented in the table 1.

Table 1. Operational characteristics of the agricultural enterprises
with different organizational and legal forms in 2009 and 2015

	Year	Stat-owned farms	Farms	Agricultural enterprises
Arable land area (million ha)	2009	0.4	1.5	15.1
	2015	0.5	1.6	14.1
Production costs (billion UAH)	2009	0.7	2.5	33.2
	2015	1.7	12.0	14.1
Revenue (billion UAH)	2009	0.8	3.2	38.6
	2015	2.0	18.9	21.2
Profitability (%)	2009	14.3	28	16.3
	2015	17.6	57.5	50.4

Source: own calculation based on the described data sample (SSSU 2017)

At the first glance, farms and agricultural enterprises have very high profitability rates in 2015, 58% and 50% respectively. However, it has rather simple explanation. The year 2015 was a year of very high inflation (consumers prices increased in about 67% (SSSU 2017). All production related costs (purchasing fertilizers, herbicides, fuel, etc.) largely occurred at the beginning of the year, when purchasing prices were low. Revenue from selling agricultural produce were obtained in the end of the year, when prices were high due to the inflation. Limitation of the annual data do not allow us to get better insight into the actual productivity of the agribusiness in 2015, however, we can state that farms and agricultural enterprises were rather profitable in 2015, while state-owned farms with the profitability of 17.6% (when inflation was 67%) were rather loss-making in 2015. Main descriptive statistics of the profit per 1 ha of arable land obtained by agricultural enterprises are presented in Table 2. It is worth emphasizing that for any organizational and legal form of enterprises persist positive skewness of the profit per 1 ha, however, the magnitude of skewness is different. Agricultural enterprises are exposed to the greatest skewness of profit per 1 ha because this category includes both innovative agribusiness and obsolete former collective farms, which have practically not changed over time. The smallest skewness is in the state-owned enterprises, and it significantly decreased over 6 years. In our opinion, this indicates that the state-owned enterprises are gradually decreasing their importance and this form of ownership is becoming substituted. Estimates of the mean profit from 1 ha of land obtained in the state-owned farms support the idea about fading dynamics of the state-owned farms development, where profitability remained on the extremely low level in 2015. On the other hand, farms and agricultural enterprises demonstrate significant progress. For farms, average profit margin has tripled and amounted to 4.1 thousand UAH in 2015, while for agrarian enterprises this indicator has increased 8 times reaching 7.4 thousand UAH in 2015 (Table 2).

Table 2. Descriptive statistics of the profit per 1 ha of arable land of the agricultural enterprises
of different organizational and legal form in 2009 and 2015 (thousand UAH in prices of 2015)

	Farms		Stat-owned farms		Agricultural enterprises	
	2009	2015	2009	2015	2009	2015
Mean	1.4	4.1	0.2	0.8	0.9	7.4
Median	1.1	3.3	0.1	0.4	0.4	2.9
Mode	0.3	2.1	0.2	0.3	0.2	0.8
Standard deviation	1.6	3.6	5.9	1.4	11.3	63.5
Kurtosis	1.0	11.1	49.4	4.1	274.8	649.3
Skewness	0.9	2.3	3.5	1.3	1.3	23.1
Number of observation	775	812	277	175	7499	6807
Coeff. of variation	1.2	0.9	29.8	1.8	12.8	8.6
Risk of negative profit, %	17.7	5.0	38.6	17.1	33.4	7.9

Source: own calculation based on the described data sample (SSSU 2017).

However, it does not mean that bulk of corporate enterprises is developing at a faster pace than corporate farms. The median profit of farms is higher than that in agrarian enterprises. That means that most farms operate more productively than agrarian enterprises. The modal value of profit for farms increased in more than 7 times, what is also significantly higher than in agrarian enterprises. This indicates that most of the farms are developing considerably faster than agribusinesses. As for the loss-making share of agricultural producers, the most significant decrease is spotted in the agricultural enterprises (from 33.4 to 7.8%), indicating effective mechanisms of the ownership right transfer to a more efficient producer. The smallest change in the mode and median of the profitable in 2015 compare to 2009, is in the state-owned enterprises (Figure 1).
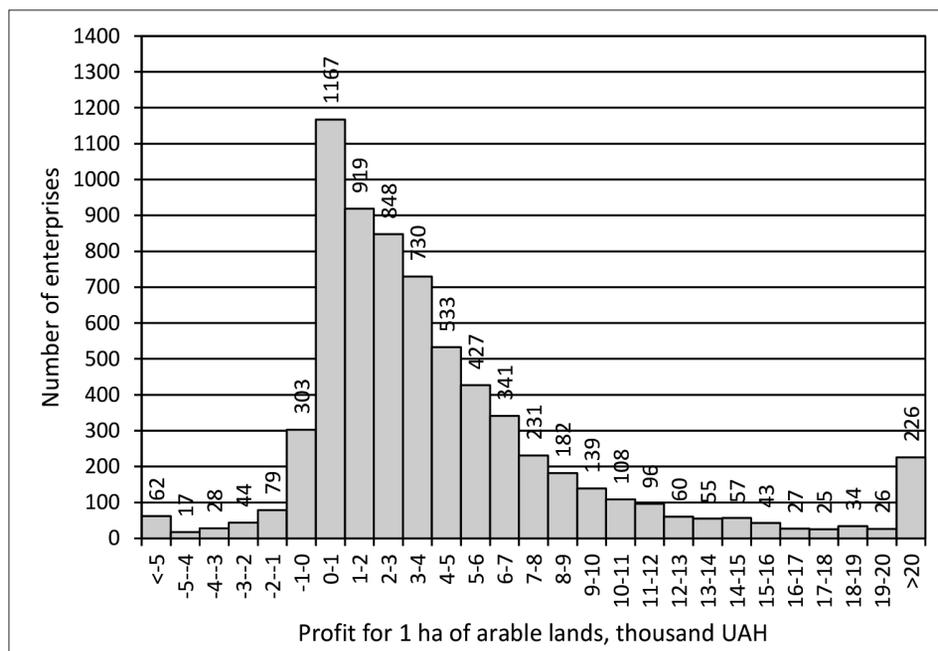

Figure 1. Distribution of income in agricultural enterprises in 2015

Source: own calculation based on the described data sample (SSSU 2017).

Such characteristics of profit per 1 hectare of arable land are far from the EU levels, where the average profit in 2014 reached 800 € / ha for maize cultivation, 300-400 € / ha for wheat, and 200 € / ha for barely (Eurostat 2016). The average profit per 1 ha of arable land in corporate farms is about 130 Euro (3900 UAH), in corporate agricultural enterprises is at the level of 250 Euro (7500 UAH), however, due to the significant skewness

of the profit distribution, only 17.5% of agricultural enterprises exceeded average profit per 1 ha (Figure 1). Among farms, skewness of the profit distribution is less evident; therefore, around 42.1% of farms exceed average profit level (Figure 2). The risks of losses of agribusiness, calculated in Table 2 are evaluated based on the distribution of profit per 1 ha of land in 2009 and 2015 for each of the three categories of enterprises (Figure 2).
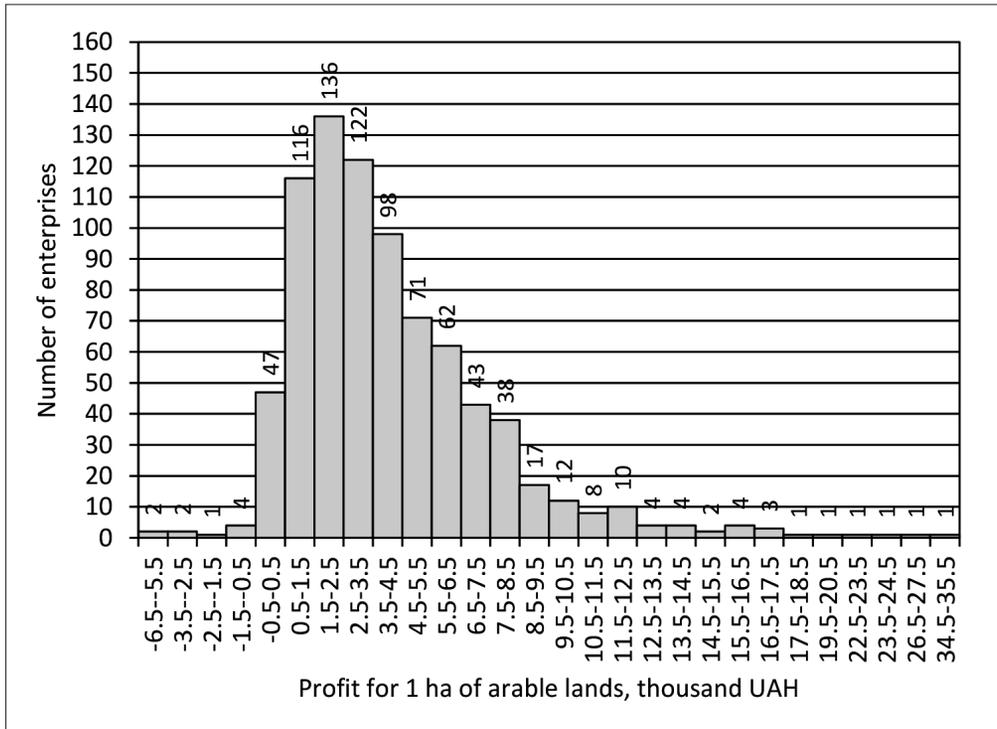

Figure 2. Distribution of income in farms in 2015

Source: own calculation based on the described data sample (SSSU 2017)

5. The model of agricultural land demand

We assume that profit, which corporate agribusiness gains from regular activities is a basis for estimating demand on land in case of the implementation of the land market. In other words, any profitable enterprise is willing to invest own profit into buying lands, and the volume of this demand is proportional to the profitability of the enterprise. In literature, price for land – LP_i is expressed with the expected rent for land $E(LR_{i+1})$ in the following year – $i+1$ and the interest rate r (Burt 1986; Klemme & Schoney 1984; Binswanger et al. 1995):

$$LP_i = E(LR_{i+1})/r, \qquad (1)$$

where $E(...)$ is the mathematical expectation, and i is time. The rent for land is determined based on the subsidies level and efficiency of production (Swinnen et al. 2008):

$$LR_{ij} = \beta_0 + \beta_1 GS_{ij} + \beta_2 X_{ij} + e_{ij}, \qquad (2)$$

where $\beta_0, \beta_1, \beta_2$ are regression coefficients in the vector form, GS_{ij} is the vector of subsidies, X_{ij} – vector of production efficiency, e_{ij} is the error term of the model, j is the spatial component.

In the conditions of the Ukrainian agricultural policy, where on average agriculture is subsidies in the amount of 350 UAH (12 Euro) per 1 ha a year (Ministry of Agrarian Policy and Food of Ukraine 2017), we can neglect the subsidies component. Therefore, we conclude that the price of land is approximated by the expected profit per 1 ha of arable land $E(Pr_{i+1})$ in the following production year (SSSU 2016). As for the land rent, we assume that it is significantly affected by the asymmetry of information about the actual profitability of the agribusiness

and landlord. Therefore, the value of 1 ha of land in the year i could be estimated in the following way:

$$LP_i = \frac{E(\text{Pr}_i)}{r_i} + e_i, \qquad (3)$$

We also neglect spatial effect j, because data in the Table 2 was calculated based on the profit distribution in the scale of entire country. This simplification does not imply that in practice the price of land on the land market will be the same all across the country. Using data on the profit distribution of the farms (Figure 1) and agricultural enterprises (Figure 2) lets estimate demand on land in case of the market of land for agricultural purposes implementation. We neglect low-profit and loss-making enterprises because of their theoretical inability to purchase land. The same reasoning is in omitting state-owned enterprises. Demand curves for farms and agricultural enterprises are calculated separately. For farms, minimal threshold of profitability is 1.5-2.5 thousand UAH per 1 ha (mean is 2 thousand UAH – 67 Euro). Agricultural enterprises are assumed to be profitable, when that profit exceeds 2-3 thousand UAH per ha (mean 2.5 thousand UAH – 83 Euro).

Annual profit of 67 Euro per 1 ha, under the interest rate of 10% creates demand on land with the price 670 Euro per 1 ha. The size of this demand is determined by the arable land area that is utilized by the enterprises that earn profit, equal to or greater than 67 Euro per ha. Generically, the algorithm of estimating the demand quantity based on the price of land could be formulated as:

$$S(p) = \sum_k S_k, \qquad (4)$$

where, $S(p)$ is the demand quantity under the price p, S_k is the land area in use of the group k of agricultural enterprises. The summing area of k is defined when:

$$\frac{Pr_k}{r} \geq p, \qquad (5)$$

Table 4 contains calculations of the demand quantity and price of land estimated using the abovementioned methodology. The estimates of the land price should be determined not only by the existing profits but also by the expected future profit (Janssen et al. 2014; Martinho 2015). In addition, besides the profit, interest rate has a significant influence on the land price. In particular, high land prices in EU are not only defined by significant profits, but also by low interest rates. High interest rates of the UAH currency is one of the reasons why it is misleading to evaluate land price in UAH. For example, with the current high interest rates of UAH in Ukraine due to the macroeconomic instability (20% interest rate), relatively high land rent in 3000 UAH (under) yields 15 000 UAH (500 Euro) price of 1 ha of land. In the following calculations, we test two different interest rates 5% and 10%. We assume that this range of interest rates may include some potential changes in the macroeconomic stability in Ukraine that will directly affect the land market.

Table 4. Demand on land depending on the price for farms and agricultural enterprises

	Farms								
Profit per 1 ha, thousand UAH (Euro)	2 (67)	3 (100)	4 (133)	5 (167)	6 (200)	7 (233)	10 (333)	15 (500)	20 (667)
Price of 1 ha of land under 10 % interest rate, UAH (Euro)	670	1000	1330	1670	2000	2330	3330	5000	6670
Price of 1 ha of land under 5 % interest rate, UAH (Euro)	1340	2000	2660	3340	4000	4660	6660	10000	13340
Volume of the expected demand (thousand ha)	1305.5	1047.2	813.8	609.9	473.3	324.4	114.8	23.7	7.8
	Agricultural enterprises								
Profit per 1 ha, thousand UAH (Euro)	2.5 (83)	3.5 (117)	4.5 (150)	5.5 (183)	6.5 (217)	7.5 (250)	10 (333)	15 (500)	20 (667)
Price of 1 ha of land under 10 % interest rate, UAH (Euro)	830	1170	1500	1830	2170	2500	3330	5000	6670
Price of 1 ha of land under 5 % interest rate, UAH (Euro)	1660	2340	3000	3660	4340	5000	6660	10000	13340
Volume of the expected demand (thousand ha)	9797.0	7965.9	6345.7	5204.4	4120.9	3230.5	1810.0	981.8	456.3

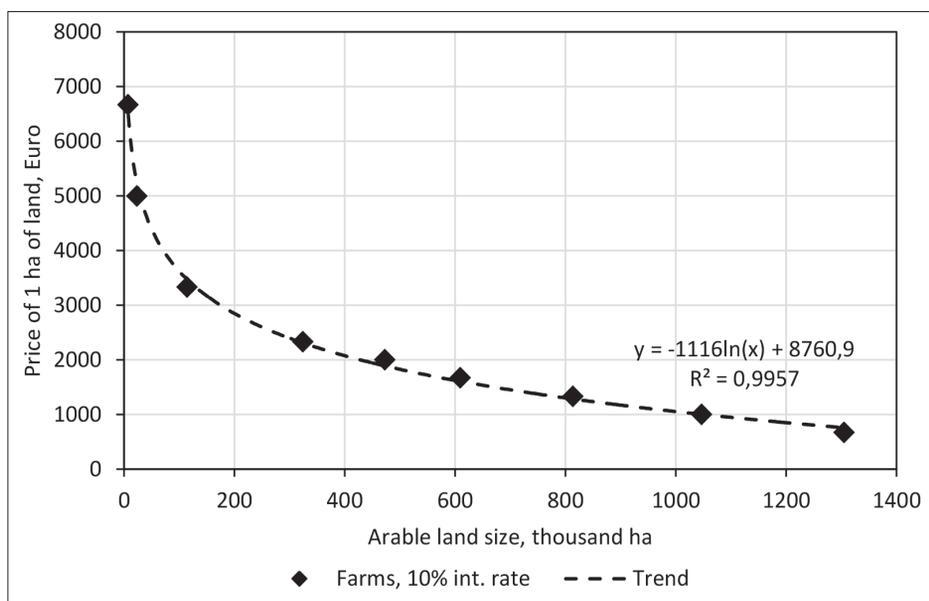*Source:* own calculation based on the described data sample (SSSU 2017).

Figure 3. Demand on land generated by farms only, assuming 10% interest rate

Source: own calculation based on the described data sample (SSSU 2017)

Based on the calculated estimates of supply we build demand curves for 5 and 10% interest rate, separately for farms and agricultural enterprises (Figure 3 and Figure 4). The demand from the agricultural enterprises is significantly higher than the demand from farms. If the price of 1 ha of agricultural land is 2000 Euro, demand of the farms is 0.5 million ha and of the agricultural enterprises is 4.5 million ha. All estimated combinations of price and quantities plotted on the figures 4 and 5. All of them correspond to the reversed logarithmic trend with coefficients of determination around 0.98-0.99 for all four regressions (for farms and agricultural enterprises with 5 and 10% interest rate).
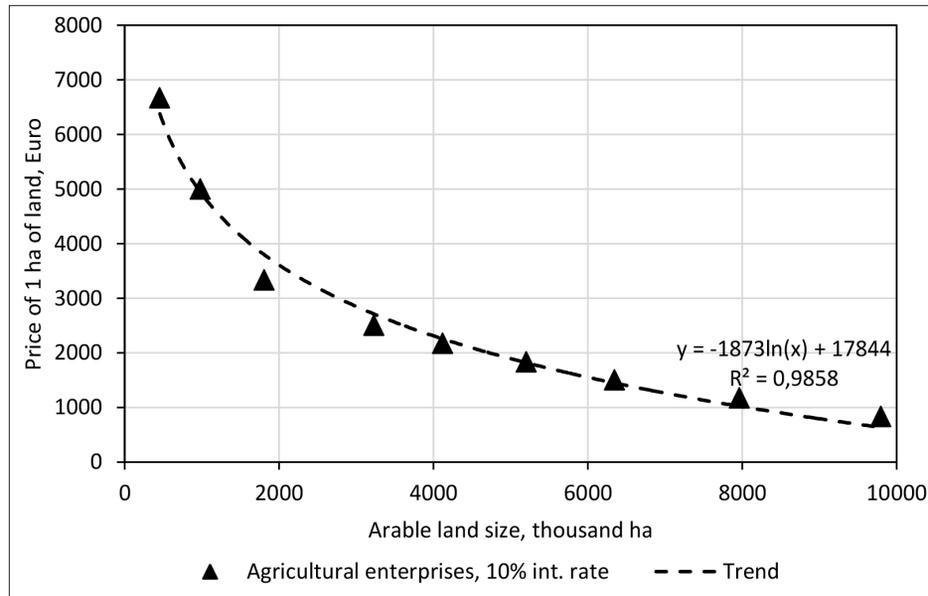
Figure 4. Demand on land generated by agricultural enterprises only, assuming 10% interest rate

Source: own calculation based on the described data sample (SSSU 2017)

Generalized, demand curves could be presented as following separately for farms and agricultural enterprises:

$$p = -a_1 \ln S + b_1, -farms$$
$$p = -a_2 \ln S + b_2, -agricultural\ enterprises' \tag{6}$$

In order to derive demand curve for total demand of both farms and enterprises, we need to sum the demand quantity for every single fixed price. The demand quantity of farms and agricultural enterprises from the equation (6) could be estimated as a reverse exponential function:

$$S_{farm} = \exp(b_1/a_1) \cdot \exp(-p/a_1)$$
$$S_{ag.ent.} = \exp(b_2/a_2) \cdot \exp(-p/a_2)' \tag{7}$$

Total demand from all existing enterprises (farms and agricultural enterprises) is defined as following:

$$S_\Sigma(p) = S_{farm}(p) + S_{ag.ent.}(p), \tag{8}$$

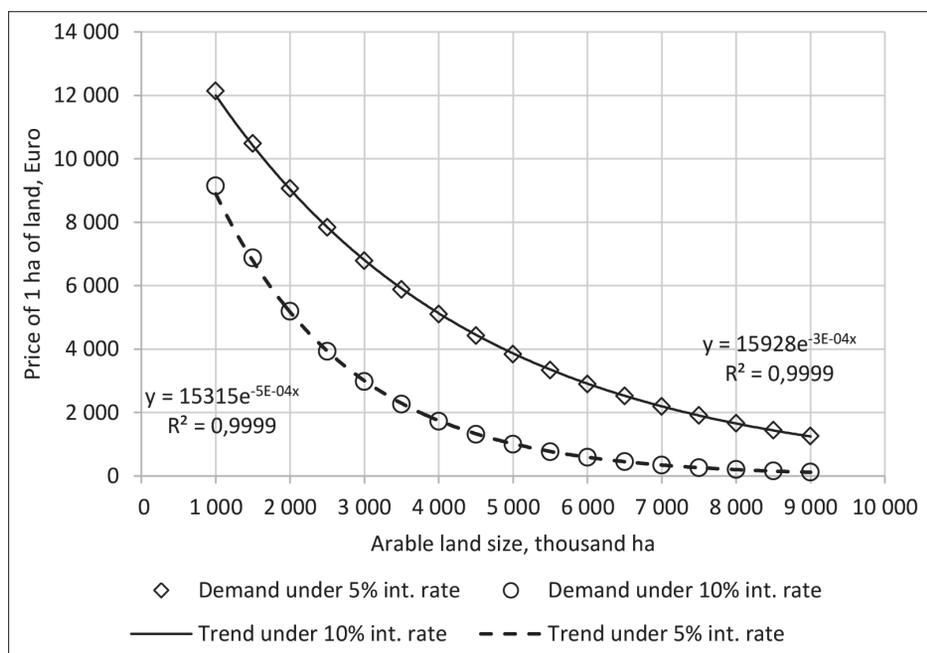Combined demand curves for both forms of agribusiness are presented at the figure 5.

Figure 5. Total demand of farmers and enterprises on land in case of the land market implementation

Source: own calculation based on the described data sample (SSSU 2017).

Area size under the demand curve is the total amount of finance that the landowners may receive, when the land market is created. It can be calculated by integrating expression 6:

$$Pr = \int_{S_1}^{S_2} p \cdot dS = 10^3 \int_{S_1}^{S_2} (b - a \ln S)\, dS = 10^3 (b + a)(S_2 - S_1) - a(S_2 \ln S_2 - S_1 \ln S_1). \qquad (9)$$

As the lower margin for integrating of in the equation 6 we accept $S_1 = 0.001$ thousand ha (1 ha), as upper margin, total land currently used by corporate farms and agricultural enterprises together, which they can purchase at the minimal prices given their profit margins: $S_2 = 1306$ thousand ha for farms and $S_2 = 9797$ thousand ha for agricultural enterprises. Multiplier 10^3 appears because the price is measured in the Euro per ha, when the area size is measured in thousand ha. The total value of land that could be set available in case of implementation of the land market is summarized in the Table 5.

Table 5. Potential benefits from selling private land plots ("pai")

	b		a		S_2 (thousand ha)	Pr	Pr (billion Euro)
	10%	5%	10%	5%		10%	5%
Farms	8760.9	17522	1116	2232	1306	2.43	4.87
Agricultural enterprises	17844	35688	1873	3746	9797	24.52	49.04
Total demand		48417		5212	11103	30.63	53.91

Source: own calculation based on the described data sample (SSSU 2017)

From the presented calculations, it is evident that corporate farms can guarantee in 2015 only 12% of the solvent demand for the area that is only 9% of the total value of demand when the interest rate is 10%. The demand from the agricultural enterprises is significantly higher. Therefore in case of immediate implementation of the land market, share of land that is bought by the agricultural enterprises will be significant. This situation may quickly change, given that profitability of farms is growing at the higher pace compare to the agricultural enterprises. Farms increase their modal profit at the rate of 0.3 thousand UAH per 1 ha per year, while agricul-

tural enterprises show the rate of 0.1 thousand UAH per 1 ha per year. Although, growth of the modal profits is higher in farms, the mean profit grows the agricultural enterprises twice as fast as in the farms, which highlights differentiation process in the agribusiness.

Total demand (8) presented on the figure 5 differs significantly under 5 and 10% interest rates. When the interest rate is 5%, decreasing exponential tendency persists, while under interest rate of 10%, decreasing exponential trend asymptotically reaches horizontal axis: $p = 15315 \cdot \exp(-0.0005 \cdot S)$. That means, that demand for large agricultural areas (6 million ha) will only be possible when prices are extremely low – less than 500 euros per ha. Reasonable to ask then, what is the solvent demand on land. In the proposed calculation, solvent demand on land is 11.1 million ha. It does not include low profit and loss making farms and agricultural enterprises (about 0.3 and 4.5 million ha respectively), small private individual farmers (2.52 million ha), small agricultural enterprises (1.77 million ha) and households – around 10 million ha (SSSU 2016). Summing up all not included components, we reach the level of 30 million ha what correspond to the total arable land area in Ukraine.

Access to the inexpensive financial resources is a key for a successful functioning of the land market. Existence of such instruments may allow to the effective agribusiness gain access to the greater land areas. Therefore, there is a need in defining a mechanism that will allow to the banks and creditors do better screening of the potential beneficiaries and invest into the most effective and productive agricultural business. This may be the only way of maintaining a solvable demand on land from the agribusiness. In case of the land market existence and sufficient capital intensification of the land demand, current owners of land – households and "pai" holders, may significantly multiply their rents and benefits from the agricultural lands. With the overall stabilization of the macroeconomic situation in Ukraine, the interest rates are expected to decrease and fall below 5% leading to the substantial increase of the land price independent from growth of profit in the agricultural enterprises. Implementation of the agricultural land market may also cause macroeconomic stabilization in the country, because it will enable agribusiness to the greater access to capital. Practically, making available for exchange land of all corporate farms and corporate agricultural enterprises analyzed in this research will make available about 10 million ha of collateral for any financial institution. That collateral is equivalent to the effective value of land, which is in between 30-50 billion Euro. This means that opening land market will simplify access to capital from any credit or investment institutions. This may effectively decrease interest rates in agricultural credits and make capital more accessible for both small and largescale farmers. It is evident, that large scale, corporate agribusiness will not be the only one, who forms demand on the land market. To the analyzed corporate farms and agricultural enterprises will also join private farms and households.

Conclusions

In the present research, we analyzed development of the corporate agricultural business in Ukraine in 2009 and 2015. We classified all organizational and legal forms of corporate agribusiness into three dominating categories: corporate farms, corporate agricultural enterprises and state-owned farms; and analyzed profitability and land-use related indicators in each category. That enabled us to derive development pattern of each category and justify methodology for estimating potential price and demand on land. Analysis of the mean profitability indicators shows that the highest rates of development are reached by corporate agricultural enterprises; however, growth of the modal part of the corporate farms demonstrates even higher rates. Taking into account profitability variation, corporate farms are the most homogenous group with the low risk of losses compared to the agricultural enterprises.

Based on the profit per 1 ha of arable land distribution in the corporate farms and agricultural enterprises, we proposed methodology for evaluation of the solvent demand on the agricultural land in both categories of corporate agricultural producers in case of the land market implementation. After narrowing the data sample to the not low profit and not loos making enterprises, we approximated potential demand price on land and volume of demand using the discounted profit margins in the long-term perspective with the given interest rate. That allowed numerically evaluate price of 1 ha of agricultural land, as well as the total value of demand from cor-

porate farms and corporate agricultural enterprises.

Based on the methodology of estimating price on land, we came to the conclusion that macroeconomic conditions in the country significantly affect the state of the land market even greater than profitability of the corporate agricultural producers. Using two interest rates of 10% (state of the macroeconomic instability) and 5% (relative macroeconomic stability), we showed, that with the current level of profitability of the corporate agricultural producers, value of land that could be purchased by them from the private owners varies from 30 to 54 billion Euro. That amount of financial flows could reach current landowners in case if they will be willing to exchange their land and the land market will be affectively implemented. At the same time, we conclude, that implementation of the land market will make agribusiness attractive to the investment and credit because land will finally become a subject for a collateral. Existence of such collateral will lead to fulfillment of the corporate and private agricultural business with investments in the amount comparable with the total value of land. Present research unfold one part of the picture and focuses on the land demand side. However, it is very important to analyses potential land supply on the market and combine it with demand in order to define an equilibrium price. Understanding of what are the institutional factors that affect equilibrium on the potential land market are is off importance for the smooth implementation of the agricultural land market in Ukraine.

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