“Modeling the impact assessment of agricultural sector on economic development as a basis for the country’s investment potential”

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MODELING THE IMPACT ASSESSMENT OF AGRICULTURAL SECTOR ON ECONOMIC DEVELOPMENT AS A BASIS FOR THE COUNTRY'S INVESTMENT POTENTIAL

Abstract

In the context of countries integration into the world economic space, agricultural sector is one of the priorities and strategically important sectors of the national economy. Development of instruments aimed to increase investment potential of this sector is therefore an important component of the country's economy growth. The article proposes a science-based model of the impact of the agricultural sector on the economic development level of countries trying to move towards European integration.

It was found that the employment rate (+58.4) has the largest influence on the rate of GDP change in the studied group of countries (Ukraine, Moldova, Georgia, Armenia). The impact of the gross value added of the manufacturing sector on its economic growth is positive (+44.6). The negative foreign direct investment ratio in the model (–40.3) may be due to the fact that the indicator in the studied countries is still largely influenced by the intervention of the state mechanism, significant uncertainty and risk, which is a deterrent to the overall economic development. An important result of the study was that foreign direct investment had a negative impact on economic growth in developing countries. Further development of the investment potential of a country's agricultural sector provides for a radical acceleration of scientific and technological progress and, on this basis, a reduction in the cost of a unit of agricultural products and food and an increase in their competitiveness in the domestic and world markets.

Keywords agricultural sector, economic development, developing countries, foreign direct investment, investment potential

JEL Classification O13, O16, Q32

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INTRODUCTION

The agricultural sector is a strategically important component of the national economy, since it generates a significant part of the country's gross product, provides a large portion of export earnings and employs millions of people. The development of the branches of the national economic complex is connected with agricultural sector development and its investment potential. Besides, the level of agricultural sector development determines decisively the state of food security of the population and the social and economic situation in the country. Foods derived from agricultural raw materials are used by the developing world population and amount to 40 to 60 percent of the budget. This determines the importance of transformations in the agricultural sector. In the context of market deepening and restructuring of the agricultural sector of the economy, the development and improvement of the financial and credit mechanism aimed at guaranteeing

the food security of the country become especially important. The agricultural sector periodically faces several crisis phenomena, which hinders its balanced development. Lack of financial resources is aggravated in the periods of falling prices for key export positions of Ukraine, global economic crises, lean years. Besides, Ukraine has been in a tense socio-economic situation in recent years, hindering the flow of new financial resources to the country, including the agricultural sector. Research on the impact of the agricultural sector on the economic development of the country is especially relevant for countries that have chosen a European development strategy and want to bring their economy closer to the indicators of EU countries.

1. LITERATURE REVIEW

Research on the impact of the agricultural sector on the country's economic climate is given so far insufficient attention of the scientific community. Considering that the system of financial support of the agricultural industry is in a state of constant transformation, this necessitates its constant dynamic theoretical analysis. In general, the scientists focused their attention on limited financial support for the agricultural sector (Jitea, 2011), the role of the state mechanism in agricultural production (Poczta-Wajda, 2015), underdeveloped financial and credit mechanism to meet the needs of farmers (Gmyria, 2013), high risk of investment in agricultural production (Davydenko & Skryphyk, 2017) and other problematic aspects. Few articles of Nigerian authors researched the agricultural sector and its impact on the country's economy and empirically examined the impact of this sector on the economic growth in Nigeria, using time series data from 1981 to 2013. Findings revealed that real gross domestic product, agricultural output, and oil rents have a long-run equilibrium relationship. The vector error correction model result shows that the speed of adjustment of the variables towards their long-run equilibrium path was low, though agricultural output had a positive impact on economic growth (Sertoğlu, Ugural, & Bekun, 2017). Other authors used Engle and Granger approach to cointegration to establish the long- and short-run behavior. They founded that a positive and significant relationship exists between revenue obtained in the agricultural sector, capital in agricultural sector proxied by loan and agricultural output, while employment and total tax generated are not statistically significant in the short run. In the long run, employment, capital and total revenue are statistically significantly correlated with agricultural output, while tax is insignificant (Oladipo, Iyoha, Fakile, Asaleye, & Eluyela, 2019).

Along with that, one of the Ukrainian researches investigated cognitive modeling of influence factors on the formation and reproduction of fixed assets of agricultural enterprises and established that the most significant factors influencing changes in the system of fixed assets are: net profit received by enterprises of the Ukrainian agricultural sector state support for agricultural producers, foreign investment in agriculture and financing of fixed assets on the basis of leasing (Yatsukh, 2019).

The evaluation of quantitative and qualitative characteristics of structural components of the land potential of the territory allows us to analyze the level of the regional economy development, identify disparities between individual elements of the investment potential, and define priority areas of regional policy in the field of land use (Kozhukhivska, Kulbitsky, Kyryliuk, Maliuga, & Podzigun, 2018).

In the conditions of the market deepening and restructuring of the agricultural sector of the economy, the development and improvement of the financial and credit mechanism aimed at guaranteeing the food security of the country become especially important. Food and Agriculture Organization of the United Nations, in the report "Analysis of the size and distribution of the impacts of agricultural trade at the firm and industry levels in developing countries" (2015), compiles a series of studies on the structure and behavior of agro-trading industries in developing countries, with the aims of investigating the size and distribution of trade impacts among agro-trading firms and providing implications for agricultural and industrial policies. It offers a blend of theoretical reviews and empirical case studies, combining analytical techniques with primary survey data on farmers, workers, and agro-exporters in

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several developing countries. The case studies highlight the strong correlation between the organization and behavior of firms in the agro-export industries and the size and distribution of trade impacts. The impacts on upstream input owners such as firm workers, and especially farmers, are also examined. What mainly stands out from the analyses is that besides the necessary actions to improve market access, efforts to provide a stable supply of high-quality agricultural products to agro-industries are key to capturing trade opportunities.

In this context, there is a need to develop a scientifically valid model of the agricultural sector impact on the level of economic development of the country trying to move towards European integration. The obtained results make it possible to determine the most priority points of the country's development that depends on the overall state of the economic system. Identified problematic aspects can be considered risks of future economic growth.

Aims

The study is aimed at development of a science-based model of the agricultural sector impact on the level of economic development of countries trying to move the European integration path.

2. METHODS

In the process of work on the selected topic, gaps in methodological support were identified regarding the modeling the influence of key factors of the agricultural sector development on the level of socio-economic development of the country. The methodological approach obtained in the process of further research should provide practical recommendations for improving the analytical work and explaining certain trends of economic development concerning the indicators of the agricultural sector in Ukraine.

To build an optimal model, the impact of agricultural factors on the level of economic development should be selected as a factor and a productive feature.

The research is conducted within the framework of a previously done grouping of countries. The study group of countries includes countries that see the vector of their development within the European Community (Ukraine, Moldova, Georgia, Armenia).

GDP per capita was taken as an indicator of economic growth (productive trait) in the analyzed countries. This indicator represents the total GDP of the country divided by the average annual population. The reason for selecting this effective indicator is that GDP is the key indicator of economic development and the most complete indicator of the total volume of production of goods and services for a certain period. But the total GDP is only an absolute indicator, and GDP per capita is already a real indicator of development, giving reason to rank countries in terms of socio-economic development. The correctness of the chosen result indicator was confirmed by the fact that the United Nations System of National Accounts (SNA 2008) indicates three possible indicators of economic growth in the country, namely: the volume of gross domestic product (GDP), real gross domestic income and real gross national income.

Given the availability of publicly available statistical information for the selected study period, the following factors were selected for the initial analysis that, according to the authors, may have an impact on the level of economic development in the country. World Bank development indicators are the source of statistics.

First of all, it was decided to build a general model of economic development. It should include baselines that directly affect the level of economic development in countries. The development indicators have been considered in the next section.

3. RESULTS

After collecting statistics on the selected indicators, the article suggests calculating the correlation of these indicators with each other.

As a result, it was confirmed that there are strong or moderate relationships between most factors. The correlation matrix is shown in Table 1.

Before moving onto further calculations, one must specify a temporal and a spatial variable.

Table 1. Correlation matrix of economic development indicators

Indicator	The ratio of employed to total population over 15 years old (Employment)	Exports of goods and services (% of GDP)	The share of GDP created in industries	Foreign direct investment (% of GDP)	GDP	GDP per capita
The ratio of employed to total population over 15 years old	1	–	–	–	–	–
Exports of goods and services (% of GDP)	0.93	1	–	–	–	–
The share of GDP created in industries	0.76	0.71	1	–	–	–
Foreign direct investment (% of GDP)	0.65	0.70	0.21	1	–	–
GDP	–0.02	–0.18	0.37	–0.58	1	–
GDP per capita	0.92	0.93	0.55	0.82	–0.29	1

This can be done using the "tsset" command in STATA. In this case, with the arguments, the command will look like: "tsset" and year. As a result of the command, the variable will be specified and the sample will be recognized cross-sectional, consisting of time series. Thus, the data will be recognized as a panel. After using this command, one can get the following issue (Figure 1).

The next stage of the study will be the construction of a regression model "wintin". This regression model will take into account the panel data structure. The advantage of this model is that it eliminates individual effects that are not observed.

Let's begin with an analysis of a group of countries trying to move towards EU integration. These are Ukraine, Moldova, Georgia, and Armenia.

```
. tsset id year
        panel variable:  id (strongly balanced)
         time variable:  year, 2007 to 2017
                 delta:  1 unit
```

Figure 1. The process of defining a spatial and a temporal variable

```
. xtreg GDP_per_capita Employment Export_of_goods Industry dir_invest GDP, fe

Fixed-effects (within) regression               Number of obs      =        38
Group variable: id                              Number of groups   =         4

R-sq:                                           Obs per group:
     within  = 0.8102                                         min =         6
     between = 0.1544                                         avg =       9.5
     overall = 0.2853                                         max =        11

                                                F(5,29)            =     24.75
corr(u_i, Xb)  = -0.3622                        Prob > F           =    0.0000

------------------------------------------------------------------------------
GDP_per_capita |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+--------------------------------------------------------------
    Employment |   58.44381   26.55165     2.20   0.036     4.139597    112.748
Export_of_goods|   42.56708    8.68126     4.90   0.000     24.81191    60.32225
      Industry |   44.62415   18.62212     2.40   0.023     6.537645    82.71066
    dir_invest |  -40.2985    10.97425    -3.67   0.001    -62.74336   -17.85364
           GDP |   .0041468   .0017681     2.35   0.026     .0005306    .0077629
         _cons |  -2620.101   938.0691    -2.79   0.009    -4538.668   -701.5347
---------------+--------------------------------------------------------------
       sigma_u |  904.77416
       sigma_e |  164.45223
           rho |  .96801964   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(3, 29) = 17.55                     Prob > F = 0.0000
```

Figure 2. Results of the assessment of the economic development model in countries trying to join the EU (fixed effects)

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Previous correlation analysis indicated directions for selecting the most significant set of factor indicators. As a result, the following basic model of economic development was obtained (Figure 2).

The evaluation results were obtained by executing the command: xtreg GDP_per_capita Employment Export_of_goods Industry dir_invest GDP, FE model.

Note that the correlation of individual effects corr (u_i, Xb) = –0.3622, which indicates a relatively weak flexibility of the fixed effects model. The quality of the fit of this model should be judged based on the coefficient "*R*-sq within" (0.81). *R*-sq between is less than the previously analyzed one and is 0.15. From this, one can conclude that in the model, interindividual differences are worse than dynamic. But further analysis is still needed to explore the necessity to consider individual effects in the model. But this is a hypothesis that should be further statistically tested.

So, let's estimate a regression model with random effects for the same set of factor traits. To do this, the following command is used: xtreg GDP_per_capita Employment Export_of_goods Industry dir_invest GDP, re. The results obtained are shown in Figure 3.

The random-effects model can be seen as a trade-off between end-to-end regression, which imposes strong homogeneity constraints on all regression coefficients for any and *t*, FE regression, which allows each sample to enter its constant and thus take into account a heterogeneity that cannot be observed in reality.

In a random-effects model (*ui*-random), individual heterogeneity is taken into account, not in the equation itself, but in a covariance matrix that has a block diagonal view, as within each group the random effects correlate with each other. Generalized least squares (GLS) should be used to estimate such regression.

The results obtained show that there is almost no endogeneity in the model due to the fact that the coefficients at the most important variables in the model were significant. The main thing is that most of the coefficients in the studied variables did not change their sign, there was only a change in the absolute size.

```
. xtreg GDP_per_capita Employment Export_of_goods Industry dir_invest GDP, re

Random-effects GLS regression                   Number of obs     =        38
Group variable: id                              Number of groups  =         4

R-sq:                                           Obs per group:
     within  = 0.5483                                         min =         6
     between = 0.9905                                         avg =       9.5
     overall = 0.9148                                         max =        11

                                                Wald chi2(5)      =    343.59
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0000
```

GDP_per_capita	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Employment	115.5702	8.931974	12.94	0.000	98.06383	133.0765
Export_of_goods	7.303089	8.037469	0.91	0.364	-8.450061	23.05624
Industry	101.3492	17.54556	5.78	0.000	66.96054	135.7379
dir_invest	-76.39878	13.80829	-5.53	0.000	-103.4625	-49.33503
GDP	-.005081	.0011428	-4.45	0.000	-.0073208	-.0028411
_cons	-4611.081	609.1729	-7.57	0.000	-5805.037	-3417.124
sigma_u	0					
sigma_e	164.45223					
rho	0	(fraction of variance due to u_i)				

Figure 3. Results of the assessing the impact of financialization on the level of economic development in the countries trying to join the EU (random effects)

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        GDP_per_capita[id,t] = Xb + u[id] + e[id,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                GDP_per~a|    700493.3        836.9548
                       e|    31101.74        176.3569
                       u|           0               0

        Test:   Var(u) = 0
                                 chibar2(01) =      0.00
                              Prob > chibar2 =    1.0000
```

Figure 4. Results of the Breusch-Pagan test

The authors suggest interpreting the value of Wald statistics, since *R*-sq should not be relied upon to evaluate the adequacy of this type of model. The high Wald chi2 (6) = 343.6 confirms the high significance of the regression in the implementation of this model.

The expression corr (u_i, X) = 0 (assumed) at the top of the table reflects an important hypothesis underlying the model. Regressors should be uncorrelated with random effects that are not observed.

Consideration of a model with random effects is caused by the following reasons:

- FE model estimates are significant for statistical models in the absence of endogeneity, but the coefficients in the most important variables in the study may prove to be incorrect;
- FE model does not allow estimating coefficients for time-invariant regressors because they are eliminated from the model after the "wintin" transformation.

Another step to assess fixed-effect regression is to use the Testparm test. This test allows for determining whether a fixed-effects model is acceptable for a given dataset. The result was that Prob > F = 0.0000. And since it is less than 0.05, this means that fixed effects are needed for a given set of indicators.

The model with random effects can be tested using the Breusch-Pagan test. The output of the study results is presented below.

The Breusch-Pagan test (null hypothesis of the random effects model adequacy) indicates that *p*-level = 1,000, indicating that the model has no random effects, and therefore it is necessary to use a fixed-effects model. This was to be expected as the model's estimates were of sufficiently high quality, and country-specific indicators were selected for the study, and their composition did not change from year to year.

Generally, a random-effects model can only be relevant if the random effect is not correlated with the regressors. In our case, a large number of indicators are correlated with each other (Figure 4).

Let's summarize the basic model of economic growth in countries trying to move towards European integration.

$$Y_x = 58.4X_1 + 42.5X_2 + 44.6X_3 - \\ -40.3X_4 + 0.0041X_5 + 2620, \quad (1)$$

where X_1 – the ratio of employed to total population over 15 years old (Employment), X_2 – ex-

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ports of goods and services (% of GDP) (Export_of_goods), X_3 – the share of GDP created in industries (Industry), X_4 – foreign direct investment (% of GDP) (dir_invest), and X_5 – GDP (n–1 period) (in USD).

The analytically obtained results can be explained as follows. The employment rate (58.4) had the largest impact on the rate of change of GDP per capita in this group of countries. In traditional economic models, employment has a significant role to play in GDP growth. The trends of change in GDP and employment level coincide, that is, if employment rises, unemployment decreases, and GDP increases accordingly.

Exports are always regarded as a source of additional income for the country. Generally, in many economic models, exports are seen as a source of overall demand, job growth. Exports provide financing for GDP growth through the sale of goods and services. Exports are also a source of foreign currency income to the country. That is, the received positive factor for the factor of export of goods and services (+42,5) is natural and logical.

The impact of the gross value added of the manufacturing sector on its economic growth is positive (+44.6). This indicator confirms the thesis that economic growth cannot be achieved without a dynamically growing manufacturing sector. The financial sector should be a service mechanism for the real manufacturing sector.

The negative ratio before the FDI indicator in the model (–40.3) can be explained as follows. For example, D. Herzer proved the impact of foreign direct investment on economic growth in 44 developing countries using a heterogeneous panel of cointegration methods that are resistant to missed variables and endogenous regressors.

The main result of his research is that FDI harms economic growth in developing countries on average, but there are large differences in impact across the different countries studied.

The average negative impact in the current model may be explained by the fact that in the considered group of countries trying to integrate into the European Community, there is a certain factor of state intervention, certain volatility, considerable riskiness, low level of entrepreneurship and more.

However, in other groups of countries, investment is one of the main means to overcome the economic crisis, structural changes in the economy, accelerate technological progress, increase the quality indicators of economic activity. Foreign direct investment is the main channel for the transfer of advanced technology to developing countries and those with economies in transition.

The next stage was the study of the impact of individual indicators of the agricultural sector on economic growth. First index was introduced into the base model to identify the most significant type of the model.

While considering the agricultural development indicators, models were constructed using the following indicators:

1) X_1 – the share of GDP generated in the agricultural sector as a % of GDP (Agriculture);

2) X_2 – cereal production volume, metric tons;

3) X_3 – percentage of cultivated land, % of the total area (Agri_land);

Consider in more detail the process of including each of the factors discussed above in the overall model of economic development in the considered group of countries. The first factor studied was the share of GDP generated in the agricultural sector of the countries under consideration (Figure 5).

Statistically, the share of GDP generated in the agricultural sector is not significant (0.37), but it did not affect the overall quality of the previously developed model. It is interesting to note that in our case the share of GDP in the agricultural sector is influenced by the stimulus, which can be explained by the fact that the post-Soviet countries may depend heavily on the degree of the agricultural sector development, since in fact, we are suppliers of raw materials to more developed value-added countries based on our raw material base.

```
. xtreg GDP_per_capita Employment Export_of_goods Industry dir_invest GDP Agricultu
> re, fe

Fixed-effects (within) regression               Number of obs      =        38
Group variable: id                              Number of groups   =         4

R-sq:                                           Obs per group:
     within  = 0.8156                                         min =         6
     between = 0.1445                                         avg =       9.5
     overall = 0.3019                                         max =        11

                                                F(6,28)            =     20.64
corr(u_i, Xb)  = -0.3444                        Prob > F           =    0.0000
```

GDP_per_capita	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Employment	64.7275	27.52199	2.35	0.026	8.351262	121.1037
Export_of_goods	41.49221	8.788599	4.72	0.000	23.48958	59.49484
Industry	37.84236	20.1235	1.88	0.070	-3.378767	79.06349
dir_invest	-39.76432	11.02404	-3.61	0.001	-62.34605	-17.18259
GDP	.0033674	.0019711	1.71	0.099	-.0006703	.0074051
Agriculture	-20.16344	22.25289	-0.91	0.373	-65.74642	25.41953
_cons	-2489.942	951.8786	-2.62	0.014	-4439.777	-540.107
sigma_u	914.38377					
sigma_e	164.96206					
rho	.96847891	(fraction of variance due to u_i)				

Figure 5. Results of estimating the influence of the share of GDP created in the agricultural sector on the country's economic development level

```
. xtreg GDP_per_capita Employment Export_of_goods Industry dir_invest GDP Cereal, f
> e

Fixed-effects (within) regression               Number of obs      =        38
Group variable: id                              Number of groups   =         4

R-sq:                                           Obs per group:
     within  = 0.8113                                         min =         6
     between = 0.1370                                         avg =       9.5
     overall = 0.2537                                         max =        11

                                                F(6,28)            =     20.06
corr(u_i, Xb)  = -0.4520                        Prob > F           =    0.0000
```

GDP_per_capita	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Employment	56.56773	27.32682	2.07	0.048	.5912798	112.5442
Export_of_goods	42.20929	8.85166	4.77	0.000	24.07749	60.3411
Industry	52.11781	26.29005	1.98	0.057	-1.734914	105.9705
dir_invest	-40.33116	11.13542	-3.62	0.001	-63.14103	-17.52129
GDP	.0041411	.0017941	2.31	0.029	.0004661	.0078161
Cereal	2.80e-06	6.82e-06	0.41	0.685	-.0000112	.0000168
_cons	-2723.381	984.5983	-2.77	0.010	-4740.239	-706.5227
sigma_u	953.30878					
sigma_e	166.86311					
rho	.97027324	(fraction of variance due to u_i)				

Figure 6. Results of assessing the impact of cereal production on the economic development level of the country

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```
. xtreg GDP_per_capita Employment Export_of_goods Industry dir_invest GDP Agri_land
>  , fe

Fixed-effects (within) regression               Number of obs      =        38
Group variable: id                              Number of groups   =         4

R-sq:                                           Obs per group:
     within  = 0.8642                                         min =         6
     between = 0.3900                                         avg =       9.5
     overall = 0.3895                                         max =        11

                                                F(6,28)            =     29.69
corr(u_i, Xb)  = -0.9930                        Prob > F           =    0.0000
```

GDP_per_capita	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Employment	38.32808	23.63994	1.62	0.116	-10.09614	86.7523
Export_of_goods	28.04295	8.649215	3.24	0.003	10.32584	45.76007
Industry	19.46409	17.71694	1.10	0.281	-16.82743	55.7556
dir_invest	-16.98662	11.75103	-1.45	0.159	-41.05751	7.084263
GDP	.0027027	.0015825	1.71	0.099	-.0005389	.0059442
Agri_land	351.0078	105.2155	-3.34	0.002	-566.532	-135.4836
_cons	20525.36	6984.754	2.94	0.007	6217.735	34832.98
sigma_u	5798.2657					
sigma_e	141.57509					
rho	.99940418	(fraction of variance due to u_i)				

Figure 7. Results of the impact assessment of the share of land cultivated on the level of country's economic development

That is, it is necessary not only to limit the export of agricultural products but to process it and create a complete cycle of production.

The second model analyzed includes the factor of cereal production (in metric tons) among the studied group of countries during the analyzed period. The results of the calculations are presented in Figure 6.

The result shows that the migrated factor, namely the volume of cereal production is not significant in this model of economic development. This can be due to several reasons, but the significance level with the factor included in the model is well above what is needed and is 0.685.

The next factor analyzed is the proportion of arable land (in % of the total area), which should influence the GDP per capita, as this is an important indicator for the theoretical power of the agricultural investment potential of a particular research object (Figure 7).

The results obtained suggest that this factor from the totality of the considered ones is generally the most appropriate in the conditions of a certain model of economic development, since the overall level of significance of the factors in the model is generally acceptable. And the multiple coefficients of determining the model is 0.86, which is a positive indicator. The importance of the amount of land to be cultivated is, in fact, the investment potential of a country, which, if successful, can develop and gain significant competitive advantages, which are gradually transformed into an increase in the overall level of economic development.

As a result of the modeling process, a general model of economic development was constructed in the first stage, which should characterize the key factors for the selected group of countries' economic development factors. In the first stage, a correlation matrix of factor indices was constructed, indicating that there was a strong or moderate relationship between them. In the next phase, two key models of panel regression construction were compared, namely fixed effects and random effects models. Subsequently, to confirm their hypothesis, the obtained models were tested using the Breusch-Pagan test and the Testparm test. The test results indicated

that a fixed-effects model should be used since there are no random effects in the model.

As a result of the calculations, it was found that the largest influence on the rate of GDP change in the studied group of countries (Ukraine, Moldova, Georgia, Armenia) was exerted by the employment rate (58.4). This is logical because if employment increases, unemployment decreases, and GDP increases accordingly. Exports are also a growth factor for this model, which is quite natural. The impact of the gross value added of the manufacturing sector on its economic growth is positive (+44.6). This indicator confirms the thesis that economic growth cannot be achieved without a dynamically growing manufacturing sector. The negative coefficient before the FDI indicator in the resulting model (–40.3) may be explained by the fact that in the studied group of countries there is still interference with the state mechanism, a significant level of uncertainty and risk, which is a deterrent to the overall economic development.

The next stage was the study of the impact of individual indicators of the agricultural sector on economic growth. The first index was introduced into the base model to identify the most significant type of model. Among the selected indicators of the agricultural complex, the share of GDP created in the agricultural complex, production of cereals, and share of cultivated land were selected. As a result, when the indicator of the share of GDP created in the agricultural sector is included, it becomes irrelevant in this model. The grain production factor, which is a key export item in Ukraine, was not significant (p = 0.685). The cultivated land factor (% of the total area) in this model was the most adequate since the significance levels for the model factors were within the normal range. And the multiple coefficients of determination of the model is 0.86, which is a positive indicator.

In other words, three indicators tested have shown that under the pre-developed economic model, the most statistically significant is the amount of arable land. Analytically, the importance of this indicator equates to the investment potential and starting point to increase competitive economic advantages in the global agricultural market.

CONCLUSION

The results of economic modeling give reason to argue that the agricultural sector is an extremely important factor that affects the overall economic level of development of the studied group of countries. It should be noted that among the selected factor traits of the final model, the volume of agricultural land is the most significant factor. Moreover, changes in this indicator have the greatest impact on the level of economic development. That is, the current economic situation depends entirely on the level of the agricultural sector development.

When considered in the Ukrainian context, agriculture is the source of one-third of export earnings to the country, more than 15% of GDP is the share of agricultural production. But despite this, quite often different levels are created, if not obstacles, then, in any case, there is a distance from solving problems of farmers.

Lack of financial support is one of the biggest obstacles to unlocking the investment potential of the agricultural sector. Considering the existing state support for the sector, only in recent years a partial increase in subsidies exists for the development of certain agricultural sectors. Quite often, the first budget programs are financed at a much smaller rate. In particular, UAH 1 billion was allocated for support to farms, but in reality, UAH 203.2 million was used in 2018. In other words, the state aid mechanism is not fully operational. Besides, there has been the ongoing talk of eliminating export VAT compensation for farmers who need these funds for development purposes.

There are also a significant number of related obstacles created by the state mechanism that impedes the growth of financial support to the industry. In particular, there are persistent problems with the licensing and certification of various products for the agricultural sector, state control over the quality

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of agricultural products, the presence of customs problems, problems with grain trucks, insufficient development of infrastructure and other obstacles that divert additional funding for things that need to be provided by the state mechanism.

The financial sector, which has to deal with the needs of the agricultural sector, does not always provide the necessary assistance. This is since particularly small-scale agribusinesses cannot obtain adequate prices for banking products because their businesses are at high risk. State support for smallholder lending also does not exist at the proper level. It can be also noted that not all banks are understood on the specifics of agricultural activity and do not have a developed mechanism for working with agrarians. Since agricultural activity involves risks, it would be logical to ensure certain crops against possible losses. However, the practice indicates a decrease in the number of agricultural insurance contracts: if in 2011 there were 2,710 units, then in 2017 this figure amounted to 957 units. And the total share of insured space decreased from 9.1% in 2007 to 2.4% in 2017. That is, there are also problems in this area of crisis prevention in agricultural sector.

The results of economic modeling give reason to argue that the agricultural sector is an extremely important factor that affects the overall economic growth of countries that are focused towards European development vector. Due to the fact that the share of products produced in agriculture sector forms a significant part of GDP, the development of the agricultural sector in pro-European countries such as Ukraine, Moldova, Georgia, and Armenia can be the basis for shaping their investment potential.

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