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## Modelling of endogenous factors impacting the efficiency of the aggregate capital in Ukraine's agriculture

**Abstract.** The economic situation in the country is estimated by using both GDP indicators and the growth rates of quantitative indicators of the national economy, including capital. The article is devoted to the economic-mathematical model of the dependence of the effectiveness of the aggregate capital of economic entities in the agricultural sector of Ukraine on endogenous factors. It is determined that factors determining financial security, capital turnover and productive processes stimulate the growth of the efficiency of aggregate capital. Proceeding from the fact that the model is significant and adequate in modern business conditions, the author of the article has concluded that the use of the developed model will allow making effective management decisions regarding the agricultural sector of Ukraine in the medium term. In this regard, a forecast for the period up to 2021 according to the determined indicators has been worked out. According to our estimates, we forecast the largest increase over the period between 2017 and 2021 for endogenous factors affecting the profitability of aggregate capital by the capital productivity ratio, and moderate growth by the investment ratio and the asset turnover ratio.

The proposed model can be used as a basis when creating a long-term forecast. To do this, it is proposed to expand the analysis of factor indicators affecting the profitability of aggregate capital in agriculture on the basis of taking into account the impact of exogenous factors. The target parameters of the impact of exogenous factors should correlate with financial and economic indicators as well as the efficiency index for agriculture in terms of macroeconomics.

**Keywords:** Economic-mathematical Model; Endogenous Factors; Impact; Aggregate Capital; Agriculture; Financial Provision; Reproduction; Asset Turnover

**JEL Classification:** C31; C65; D24; G23; G30; Q14

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### Модельювання ендогенних чинників впливу на ефективність сукупного капіталу в сільському господарстві України

**Анотація.** У статті побудовано економіко-математичну модель залежності ефективності сукупного капіталу суб'єктів господарювання у сільському господарстві України від ендогенних чинників впливу. Визначено, що зростання ефективності сукупного капіталу стимулюють фактори стану фінансового забезпечення, оборотності капіталу та стану відтворювальних процесів. Розроблена модель є значимого та адекватного сучасним умовам господарювання. Її можливо застосовувати для формування середньострокового прогнозу. При розширенні аналітики макроекономічних індикаторів впливу на прибутковість сукупного капіталу у сільському господарстві дану модель можна використовувати як базову для побудови довгострокового прогнозу.

**Ключові слова:** економіко-математична модель; ендогенні фактори впливу; сукупний капітал; сільське господарство; фінансове забезпечення; відтворення; оборотність активів.

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### Моделирование эндогенных факторов влияния на эффективность совокупного капитала в сельском хозяйстве Украины

**Аннотация.** В статье предложена экономико-математическая модель зависимости эффективности совокупного капитала субъектов хозяйствования в сельском хозяйстве Украины от эндогенных факторов влияния. Установлено, что повышение эффективности совокупного капитала стимулируют факторы финансового обеспечения, оборачиваемости капитала и состояния воспроизводственных процессов. Разработанная модель является значимой и адекватной современным условиям хозяйствования. Ее можно применять для формирования среднесрочного прогноза. При расширении аналитики макроэкономических индикаторов влияния на прибыльность совокупного капитала в сельском хозяйстве данную модель можно использовать как базовую для построения долгосрочного прогноза.

**Ключевые слова:** экономико-математическая модель; эндогенные факторы влияния; совокупный капитал; сельское хозяйство; финансовое обеспечение; воспроизводство; оборачиваемость активов.

### 1. Introduction

The economic situation in the country is estimated by using both GDP indicators and the growth rates of quantitative indicators of the national economy, including capital. Therefore, the study of the impact of external (exogenous) and internal (endogenous) factors on the effective functioning of capital at the macro- and micro-levels is relevant. Today, the key factors that lead to an increase in the profitability of capital on an endogenous basis in relation to business entities, including the agrarian sector of the economy,

are not scientifically substantiated. Hence, the purpose of the research is to substantiate the dependence of the profitability of capital on financial support, capital turnover and productive processes, to determine the multi-factor correlation and regression dependence in the model and the development of the medium-term forecast on this basis. The author has used the following methods to conduct the research: statistical and economic methods to study the interconnections between financial and economic processes, and to identify factors impacting performance indicators;

the forecasting method to justify probability of future development of the research object in a given time period, based on the analysis of retrospective data and endogenous impact factors.

## 2. Brief Literature Review

A significant contribution to statistical theory and modelling was made by P. M. McCullagh and J. A. Nelder (1989) [11]; D. V. Hinkley, N. Reid and E. J. Snell (1991) [5]. A toolkit for applied regression analysis has been worked out by J. O. Rawlings, G. P. Sastry and D. A. Dickey (2001) [16]. A. Dobson (1990) [3] presented a unified theoretical and conceptual framework for statistical modeling in an accessible form.

Z. Naglova, B. Boberova., T. Horakova and L. Smutka (2017) [14] conducted a statistical analysis of the factors impacting the results of agricultural enterprises' activities of the Czech Republic.

O. Oliynyk and V. Adamenko (2015) [15] identified the main financial indicators and conducted a comparative analysis of the financial system of Ukraine and leading European countries.

Ukrainian scientists has made a significant contribution to the study of factor indicators impacting financial activity and enterprises capital functioning. The expediency of using the indicators of liquidity, financial stability, business activity and profitability for assessing the financial stability of enterprises was justified by N. M. Davydenko (2005) [2]. The effectiveness of the application of multifactorial discriminant analysis to assess creditworthiness was defined by O. H. Malii, (2017) [10].

Research on effective management decisions regarding fixed assets and enterprises capital through modelling and forecasting methods was carried out by L. V. Smolyi and S. M. Kolotukha (2017) [18], N. Shura (2012) [17] and S. O. Ishchuk (2015) [6].

## 3. Purpose

The purpose of the research is to construct an economic-mathematical model of the dependence of the efficiency of aggregate capital of economic entities in the agricultural sector of Ukraine on endogenous impact factors. The purpose determines a set of properties in modelling the object, which will be reflected in the model. In our study, we proceeded from the fact that factors that are endogenous in nature are dependent on the financial policy of the enterprise and specifics of industrial activity. Endogenous factors are subjective and have a quantitative estimate. The construction of the model will take place in three stages.

## 4. Results

### *Construction of the basic model*

At the first stage of research, we collected and processed statistical data and financial reporting on the agricultural sector of Ukraine in respect of the period between 2001 and 2016 [12-13; 19]. Also, we calculated the main indicators of economic activity, as well as financial indicators of selected economic entities. After studying the analytical material, we identified endogenous factors impacting the profitability of the aggregate capital indicators of productive processes and determined the efficiency of production and economic activity, based on indicators of financial support and capital turnover of economic entities in the agriculture in Ukraine.

At the second stage, by constructing an extended correlation matrix, we verified the selected factors in terms of multicollinearity, which allowed us to select the most appropriate factors to create the basic model. Having identified the nature of the relationships between the factors (linear, logarithmic, quadratic, hyperbolic, etc.), we detected the impossibility of applying a logarithmic, quadratic, and hyperbolic dependences (insignificance according to the Student's criterion, and inappropriateness to Fisher's criterion) was established. As a result of the statistical analysis, a high reliability of linear interdependence was found, which led to further research based on the use of a linear multifactorial model. Consequently, we constructed two basic models, in which the capital return and the profitability

of operating activities were determined based on the performance indicators.

The main factors of the production process and financial support that affect the capital outflow of fixed assets ( $Y_1$ ) were as follows: the ratio of long-term financial security of the first order (the first degree for the investment factor), the ratio of funds and expenses coverage, the real value ratio of fixed assets in the enterprise property, the depreciation factor of fixed assets, the factor of suitability of fixed assets, the ratio of fixed assets renewal, the ratio of long-term financial provision of second order (second degree), the ratio of the cumulative rate of reproduction of fixed assets. Despite the strong and very strong impact of each of the individual factor, we consider, the dependence of capital productivity on the investment factor ( $X_1$ ), the ratio of aggregate reproduction ( $X_2$ ), the ratio of fitness of fixed assets ( $X_3$ ) to be statistically significant in the multifactorial equation, with the ratios of pair correlation equalling 0.838; 0.854; 0.838, respectively. Herewith, the tightness of communication is 0.894 (strong), and the determination ratio is 0.797. Consequently, the variation in capital productivity by 79.7% depends on the investment ratio, the ratio of aggregate reproduction, the ratio of suitability of fixed assets.

The correlation and regression dependence of capital productivity ( $Y_1$ ) on the factors is the following:

$$Y_1 = -2,1681 + 0,0222X_1 + 0,0621X_2 + 0,0350X_3. \quad (1)$$

We can conclude that with an increase in the ratios of investment, aggregate reproduction and suitability of fixed assets by 1%, capital productivity will increase by 0.02%, 0.06% and 0.03% respectively, according to the average values in the sample. The return on capital shows the efficiency of the use of fixed capital and is calculated as the ratio of the increase in the value (in monetary terms) of agricultural products at a certain time to the original average annual value of fixed capital, which shows what sum of the value of gross output falls per UAH 1 value of fixed capital.

In the works by Ukrainian economists, it is noted that in a period of inflation, when the prices for fixed assets are growing at a rapid pace, it is expedient to determine the capital output by the commodity output estimated at current sales prices [1; 4; 8]. Concerning the effect of inflation, we consider this conclusion to be correct. At the same time, the issue of the capital returns calculation on the basis of the value of commodity output is under discussion for the reasons given below. The specificity of agricultural production lies in the fact that agricultural products produced during a certain time are mainly consumed within the agricultural sector, for example by households, the share of which in the structure of intermediate consumption was 45% in the period between 2012 and 2016 [19]. An increase in the share of intermediate consumption in the output volume of agricultural products leads to an increase in the cost and production capital intensity, decreasing capital productivity gains. Therefore, in our opinion, the initial data for the capital output calculation should not be commodity output, but the total output of agricultural output in current prices (as part of the country's domestic product, which allows an objective assessment of the current activities of the agricultural enterprise). Another specific feature is that gross agricultural output includes a recurrent account, which depends directly on the volume of production of own production, which will be used (consumed) in the future period to sustain the production process. There is no doubt that the capital reproduction factor is one of the factors that impacts the efficiency of capital productivity. We proceed from the assumption that the level of suitability and renewal of fixed assets characterise the overall potential of the economy, and the dynamics of the fixed capital value reflects general trends in the country's social and economic development and the ability of capital to be expanded [6]. The positive dynamics relating to the excess of fixed assets value received during the year over the initial cost of all fixed assets at the beginning of the year testifies

to the stability of the trend of aggregate reproduction of capital in Ukraine's agriculture. However, the estimated data show that there was no qualitative increase in the fixed capital reproductive potential - the actual level of suitability of fixed assets for the period from 2001 to 2016 was not very high (Table 1).

The maximum output for UAH 1 of fixed capital can also be ensured due to the growth of production volumes without attracting additional investments. Practical implementation of this process requires effective mobilisation of own financial resources. If an economic entity has potential to cover (financially secure) investments in non-current assets with its own capital, the investment ratio will equal to 1 or exceed it. The ratio of the growth rate of equity and non-current assets was examined in our previous studies [9]. We consider the investment ratio to be an endogenous factor of capital output productivity. In agriculture, during the period under study, the share of sources of own funds in the private sector in covering non-current assets was quite high (Table 2). This trend is explained, among other things, by the stable profitability of agriculture and the exceeding average value of the equity capital profitability level over the average rate of capital output among the branches of the economy [8].

To a certain extent, the investment factor is the financial stability indicator in relation to determining the level of entity solvency, the liquidity of its assets and the liquidity of the balance sheet. Financial policies of each enterprise should be aimed at ensuring the optimal combination of liquidity and profitability of the enterprise. Profitable use of available resources by economic entities reflects the resource productivity rate, which is the assets turnover rate (aggregate capital). Taking into account the fact that the turnover rate of the aggregate capital (assets turnover) of the enterprise shows the corresponding effect of each unit of assets in relation to the full cycle of production and capital turnover, we consider it expedient to determine the impact of factor indicators on the profitability of operating activities. In this sense, we agree with the conclusions made by leading scientists who have proved that the production efficiency and economic activity are impacted not only by the state of capital reproduction but also by factors such as the use of current assets, their turnover, the efficiency of financial and investment activities, etc. [2; 10; 17].

The main factors of the capital turnover that affect the profitability of operating activities are determined as

follows: the working capital, the absolute liquidity ratio, the rapid liquidity ratio, the current liquidity ratio, the ratio of general liquidity balance, the assets turnover ratio and the mobility factor. Despite the strong and very strong influence of each individual factor on the result, on the basis of the calculations, the dependence of the operating profitability ( $Y_2$ ) on the total balance liquidity ratio ( $Z_1$ ) and the asset turnover ratio ( $Z_2$ ) is statistically significant in the multifactorial equation; the communication tightness is 0.838 (strong), and the determination ratio is 0.702. Thus, the variation in the profitability of operating activities by 70.2% depends on the overall liquidity of the balance sheet and the assets turnover.

The correlation and regression dependence of the operating profitability on factors is the following:

$$Y_2 = -18,838 + 0,16639Z_1 + 0,45344Z_2 \quad (2)$$

With the increasing ratio of general liquidity of the balance sheet and the rate of return on assets by 1%, the profitability of operating activity increases by 0.16% and 0.45%, respectively, regarding the average values in the sample.

*Creation of an integrated model of the impact of endogenous factors on the productivity*

Positive dynamics of effective activities of economic entities in agriculture is the basis for stabilizing productive processes on an expanded basis. The determination of the impact of the state of the fixed assets, the capital turnover and the efficiency of production processes on capital profitability, production efficiency and economic activity in the conditions of financial and economic stabilization in the agricultural sector of Ukraine is of particular relevance. Therefore, the second stage of our research is aimed at constructing an integrated model of the impact of endogenous factors on productivity, including the profitability (viability) of aggregate capital. A quantitative and qualitative assessment of the aggregate capital efficiency provides a definition of its profitability level for net profit. We consider it appropriate to base this conclusion as follows: the return on aggregate capital at net profit is a profitability indicator, which indicates the amount of net income generated by each hryvnia (UAH), invested in the value of the aggregate capital. The aggregate capital of an economic entity affects the level of a certain generation in the operational, financial and investment sectors, combining them into a single complex. It is a complex of operational, financial, investment actions that integrates the net profit.

The conducted research and calculations allow us to select factor indicators which closely correspond with the outlined modelling purpose. The analysis of the two previous basic models was also taken into account. Thus, the analysis of the system of factors directly affecting the efficiency of aggregate capital (net profit margin) ( $Y_3$ ) makes it possible to conclude that there are endogenous factors such as the investment ratio ( $X_1$ ), capital productivity ( $Y_1$ ) and return on assets ratio ( $Z_2$ ). The communication tightness, which is considered to be strong, is 0.882, while the determination ratio is 0.777. As the determination ratio shows, the variation in the return on aggregate capital by net profit ( $Y_3$ ) by 77.7% depends on the total impact of the three factors under investigation, including 21.4% on capital productivity, 11.5% on assets turnover and 44.8% on the investment factor.

The correlation and regressive dependence of the profitability of

Tab. 1: Analytical indicators of fixed assets reproduction (agribusiness entities in Ukraine)

Index	Years								2016/2001, +/-
	2001	2004	2007	2009	2013	2014	2015	2016	
Net increase in fixed assets, UAH billion	0.55	1.46	4.81	6.41	13.91	13.38	19.58	38.08	37.53
including in % to the value of fixed assets at the beginning of the year	0.59	1.94	6.09	6.21	10.06	9.11	11.84	18.07	-
Net input of fixed assets, UAH billion	-0.22	-0.09	2.44	1.59	4.16	3.05	6.75	22.74	22.96
including in % to the value of fixed assets at the beginning of the year	-0.23	-0.11	3.09	1.54	3.00	2.076	4.08	10.78	-
Outstanding depreciation, UAH billion	0.77	1.55	2.36	4.82	9.75	10.33	12.83	15.34	14.57
including in % to the value of fixed assets at the beginning of the year	0.82	2.05	3.00	4.67	7.05	7.04	7.76	7.28	-
Factor of the validity of fixed assets, %	51.84	53.13	61.23	64.18	61.58	58.20	57.58	62.70	-

Source: Compiled by the author based on [12-13; 19]

Tab. 2: Indicators of long-term financial security of agricultural entities in Ukraine

Index	Years								2016/2001, +/-
	2001	2004	2007	2009	2013	2014	2015	2016	
Ratio of long-term financial security of the first order (investment ratio)	0.97	1.01	1.14	1.10	1.33	1.33	1.61	1.69	0.64
including deviations from the optimally acceptable value	0.27	0.31	0.44	0.40	0.63	0.63	0.91	0.99	-
The ratio of long-term financial security of the second order	1.06	1.17	1.42	1.47	1.69	1.84	2.01	1.97	0.95
including deviations from the optimally acceptable value	-0.54	-0.43	-0.18	-0.13	0.09	0.24	0.41	0.37	-

Source: Compiled by the authors using [12-13; 19]

aggregate capital on the net profit resulting from the above factors is the following:

$$Y_3 = -14.904 + 1.3338Y_1 + 0.09256Z_2 + 0.101011X_1 \quad (3)$$

On the basis of the obtained equation, let us analyse the ratios of the equation and interpret their meanings:

$Y_1 = 1.3338$  - on the condition of the invariability of other factors, with an increase in capital efficiency by 1.0%, the return on aggregate capital by net profit will increase by 1.33%;

$Z_2 = 0.09256$  - if the asset turnover ratio increases by 1.0%, the net profit profitability of the net profit will also increase by 0.09%, provided that all other factor indicators will remain unchanged;

$X_1 = 0.101011$  - if the investment factor increases by 1.0%, then the net profit margin of the net profit will increase by 0.10%, which means that there is a direct link between the return on aggregate capital and the potential of the entity to cover equity investments in non-current assets.

Thus, on the basis of the constructed economic and mathematical model, we have determined a linear dependence (communication tightness - 0.882, determination ratio - 0.777) of the efficiency of aggregate capital of agribusiness enterprises in Ukraine on endogenous impact factors, including: the state of reproductive processes (capital productivity), capital turnover (the asset turnover ratio), the financial support indicator (the first-rate ratio of long-term financial security, which is the investment ratio). We consider it appropriate to make relevant management decisions regarding the efficiency of aggregate capital, with the help of calculations on the basis of the obtained model. By adjusting the factors mentioned in the model, it is possible to predict the efficiency of aggregate capital in the medium term, which in turn will impact decision-making on managing investment activities and increase the productivity of operational activities of business entities in the agricultural sector in Ukraine. Also, the developed model can be used as a financial mechanism for substantiation of perspective directions of financial activity.

*Creation of the medium-term forecast of factor and performance characteristics*

The next step of our research is to build a forecast for the period up to 2021, according to the determined indicators. Based on mathematical models constructed using the correlation and regression analysis and taking into account information about the object of forecasting and its development, we regard it appropriate to consider the following provisions. The information in the output arrays which belongs to continuous values; its accuracy is due to calculations for the long-term period (2001-2016). According to the actual and estimated data, we constructed a trend line. Also, we proceeded from the fact that the choice of model for forecasting depends on the reliability of the forecast. To present our forecast, we considered the following types of approximating dependencies: linear, logarithmic, polynomial, power, exponential, linear filtration, etc. [3; 5; 11]. Approximation, as a method of scientific research, is used to analyse, synthesise and further apply the empirical results [5; 11]; To determine the accuracy of the forecast, the value of the approximation error ( $R^2$ ) is used: the closer the value ( $R^2$ ) to 1, the more precisely the chosen model reflects the tendency of development, which means that our forecast is more reliable [16-17].

On the basis of the analysis, we set a type of curve, which is better suited

for the approximation of empirical (actual) data. The exponential curve and the polynomial dependence of the 2<sup>nd</sup> degree approximate our output data the best, as evidenced by the obtained determination ratios (Table 4). We have to construct trend lines for the investment ratios, the fixed assets total reproduction, the fixed assets suitability the total balance liquidity, the assets turnover, capital returns. For example, Figure 1 shows a graph of forecasting the investment ratio using the trend line. It contains the graph of prediction of the aggregate reproduction ratio of fixed assets using the trend line and the aligned polynomial curve. The polynomial approximation is used because the ratio of aggregate reproduction of fixed assets calculated on the basis of actual data for the period of 2001-2016 is an amount that may either increase or decrease and is unstable.

The second-order polynomial, the deviation of which from the graph of the initial function is minimal, is defined as suitable for our study. The method of least squares is chosen for the polynomial approximation method. The polynomial approximation based on the ratio of aggregate reproduction of fixed assets has a degree of certainty  $R^2 = 0.3457$ , (the connection is moderate but not weak). Also, according to the calculations, this connection proved to be more reliable than in other variants of alignment by analytic functions.

As noted, the exponential curve approximates in the best way for the ratios of investment, the fixed assets aggregate reproduction, the fixed assets suitability, the total balance liquidity, the assets turnover and capital returns. The data value of the ratios (calculated on the basis of actual data for the period between 2001 and 2016), either increases or decreases at an ever-increasing rate. The ratios do not contain negative values, which also confirms the correctness of the choice of the approximation curve. Hence, the exponential trend line is most suitable for our values. All factors that we predict have a high degree of prognosis (Table 3).

Further, we calculate the forecasted performance indicators. We determine, therefore, the forecast of factor and performance indicators for the years 2017-2021.

According to our estimates, we forecast the largest increase over the period between 2017 and 2021 for endogenous factors affecting the profitability of aggregate capital by the capital productivity ratio, and moderate growth by

Tab. 3: The result of alignment by analytic functions

Indicator (Factor)	Approximation type	Forecast model	R <sup>2</sup>
Bloc 1			
Investment ratio	Exponential	$y = 88.051e^{0.0364x}$	0.8783
Fixed assets aggregate reproduction ratio	Polynomial	$y = 0.0789x^2 - 0.6789x + 8.8298$	0.3457
Fixed assets suitability ratio	Exponential	$y = 52.631e^{0.0128x}$	0.4918
Bloc 2			
Total balance liquidity ratio	Exponential	$y = 32.115e^{0.0928x}$	0.8432
Assets turnover ratio	Exponential	$y = 35.116e^{0.0344x}$	0.7391
Bloc 3			
Capital returns (fixed assets)	Exponential	$y = 87.864e^{0.0365x}$	0.8782

Source: Author's own calculations

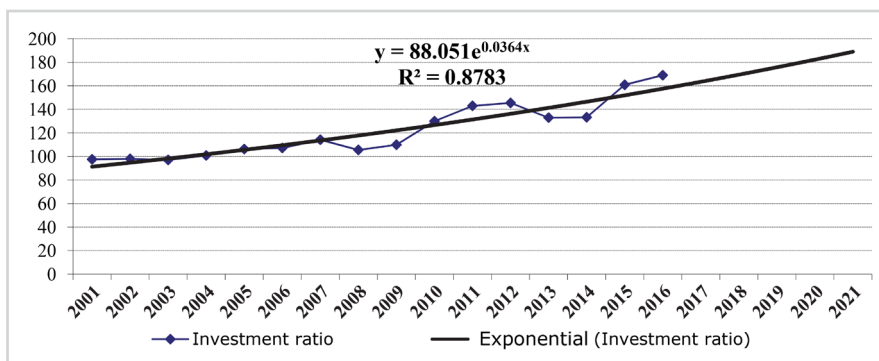


Fig. 1: Forecast chart of the investment ratio using the trend line aligned with the exponential curve (degree of reliability,  $R^2 = 0.8783$ )

Source: Author's own calculations

Tab. 4: Forecasting factors and, accordingly, forecasting performance indicators for the 2017-2021 period

Indicator (factor)	Year				
	2017	2018	2019	2020	2021
Bloc 1					
Investment ratio,%	163.5	169.5	175.8	182.3	189.1
Fixed assets aggregate reproduction ratio,%	20.1	22.2	24.4	26.8	29.4
Fixed assets suitability ratio,%	65.4	66.3	67.1	68.0	68.9
<b>Capital recovery (fixed assets)</b>	<b>5.0</b>	<b>5.3</b>	<b>5.6</b>	<b>5.9</b>	<b>6.3</b>
Bloc 2					
Total balance liquidity ratio,%	155.5	170.7	187.3	205.5	225.5
Assets turnover ratio,%	63.0	65.2	67.5	69.9	72.3
<b>Operating activity profitability,%</b>	<b>36.1</b>	<b>39.6</b>	<b>43.4</b>	<b>47.5</b>	<b>52.0</b>
Bloc 3					
Capital recovery (fixed assets)	5.0	5.3	5.6	5.9	6.3
Asset turnover ratio,%	63.0	65.2	67.5	69.9	72.3
Investment ratio,%	163.4	169.5	175.8	182.3	189.1
<b>Return on aggregated capital by net profit,%</b>	<b>14.1</b>	<b>15.3</b>	<b>16.6</b>	<b>17.9</b>	<b>19.2</b>

Source: Author's own calculations

the investment ratio and the asset turnover ratio. This model is designed for the medium term. To build the forecast of changes in the profitability of the aggregate capital in the long-term period, the proposed model can be modified. At the same time, it is necessary to take into account that the main thing in developing a long-term forecast is the potentiality, which should be reflected by the relevant information [7, 328]. The information field of the research should be expanded and supplemented with analytical data on exogenous factors impacting the capital profitability. The economic phenomena of exogenous nature exist autonomously; they do not integrate and do not pass into each other, but there is systemic interaction between exogenous and endogenous impact factors, which together represent a differentiated multi-level system. The target parameters of the impact of exogenous factors should correlate with financial and economic indicators as well as the efficiency index for agriculture in terms of macroeconomics.

### 5. Conclusions

As the correlation analysis shows, the factors relating to financial security, the capital turnover and production processes

stimulate the growth of the efficiency of aggregate capital. An increase in the impact of endogenous factors (capital outflow, asset turnover and investment) leads to an increase in the return on capital. To model the impact of endogenous factors on the efficiency of aggregate capital in agriculture, we propose the following: processing of statistical and financial reporting data, calculation of the main indicators of financial and economic activity of economic entities, determination of the impact of endogenous factors on the return on aggregate capital; the construction of an expanded correlation matrix and the verification of selected indicator factors for the presence of multicollinearity between them, the creation of a basic model; construction of an integrated model of the impact of endogenous factors on the outcome; a medium-term forecast of the dependence of the profitability of aggregate capital on the financial security, the turnover of capital and productive processes in the agricultural sector in Ukraine.

We have created a multifactor correlation model which takes into account development factors of economic processes with regard to agribusiness entities in Ukraine. The model is significant and adequate in terms modern conditions of management in the agricultural sector. Therefore, it is expedient to use it to forecast the profitability of aggregate capital of economic entities in the agricultural sector of Ukraine on the basis of taking into account endogenous impact factors. The use of this model makes it possible to more clearly define the structure of the estimated indicators of endogenous impacts on the capital productivity and allows making effective management decisions relevant to the agricultural sector in the medium term. We consider it possible to use this model as a basis for forming long-term forecasts. To do this, it is proposed to expand the analysis of indicator factors affecting the profitability of aggregate capital in agriculture on the basis of taking into consideration exogenous factors.

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