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IMPACT ASSESSMENT OF FACTORS ON INCOME DYNAMICS IN RURAL AREAS IN CONTEXT OF STRUCTURAL CHANGES IN AGRICULTURE

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ABSTRACT

Motives: This study analyzes the impact of structural changes in Azerbaijan's agriculture, especially changes in the structure of land resource use on dynamics of agricultural household income. The results obtained in this regard are of interest in terms of a more accurate assessment of the role of factors determining the level of well-being of the population in rural areas.
Aim: This research aims to identify the nature, direction and scale of the impact of the structural changes in agriculture on the incomes of households in rural areas.
Results: Results of the study indicate that there is a significant positive correlation between indices of cultivated areas and pasture and mowing areas, as well as between the number of animals in conventional units (head) and the index of average monthly income per capita from agricultural activities. There is a significant negative correlation between the index of perennial plants and average monthly income per capita from agricultural activities. In the recent period, a combination of relevant factors created conditions that were unfavorable for significant growth in rural incomes derived from agricultural activities.

Keywords: land, agriculture, agricultural land use, population income, income dynamics, land resources

INTRODUCTION

In today's world, it is noteworthy that indicators for a population's well-being, including the level of income, are comparatively lower in rural areas, and this is typical for both developed and developing countries. Per capita incomes of households in rural areas lag significantly behind the corresponding indicator in cities. Significant progress in reducing

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the gap in this area is especially relevant in developing countries.

Ensuring the dynamic growth of incomes in rural areas has an important role in terms of eliminating poverty and reducing inequality, which is part of the UN Sustainable Development Goals (UN, 2015).

The overall level and dynamics of household incomes in rural areas, especially in developing economies, are shaped significantly by incomes from agricultural activities (FAO, 2025; Damodaran et al., 2021).

Income from agriculture is one of the main factors that determines the level and dynamics of the average monthly income per capita in rural areas (Kata & Wosiek, 2024; Tatis Diaz et al., 2022). Tatis Diaz et al. (2022) found that non-agricultural income had no significant impact on household well-being in northern Colombia and agricultural income remains a key determinant of household well-being in such regions. Thus, the decrease in the share of average monthly income per capita is a significant challenge. In Azerbaijan, this indicator was 62.2% in 2001, 31.2% in 2008, 26.0% in 2016, and 24.4% in 2022 (Author's calculations are based on the data of the State Statistics Committee of the Republic of Azerbaijan (SSC, 2024)).

This is due to the fact that the growth rate of income from agricultural activities lags far behind the growth rates of income from other sources. The weak growth rate in income received from agriculture compared to the income received by households from other sources has resulted in a steady decline in agriculture's proportional share.

Relatively low growth rates of incomes from the agricultural sector create a problem meeting requirements for ensuring better dynamics of household welfare indicators in rural areas. This situation is also not favorable with regard to reducing the existing difference between income levels in urban and rural households. It should be noted that in 2022, the average monthly household income per capita in Azerbaijan's rural areas was 8.9% less than the corresponding indicator in urban areas. In that year, the growth rate of monthly income per capita in rural areas was one percentage point lower than in urban areas.

From 2000 through 2016, Azerbaijan's growth rates of the nominal monthly per capita income in rural areas accorded with the growth rates of the gross agricultural product in actual prices. From 2001–2016, indicators of the average annual growth rates were 9.1 and 10.6 percent, respectively (Author's calculations are based on the data of the SSC). Subsequently, however, more precisely in the period after 2016, there was a sharp discrepancy between the growth of income in rural areas from agricultural activities and the growth in the gross agricultural product. The average annual prices recorded in 2017–2022 were 1.7 and 10.8 percent, respectively (Author's calculations are based on the data of the SSC). In addition, we also emphasize that there was no significant difference in the physical volume of total agricultural product during the periods we compared. The average annual value of this indicator was 4.0 percent in 2001–2016 and 4.2 percent in 2016–2022.

Given the above, we hypothesize that the situation described is related to structural changes in agriculture, especially changes in the structure of land resource use.

In the 1990s, Azerbaijan's agriculture experienced a deep crisis due to the basic transformation of the country as it transitioned from the socialist system to the market economy system. After the fundamental agrarian reforms carried out in the course of this process, agriculture entered a path of revival and development.

In the 2000s, the long-term strategies implemented in Azerbaijan's agriculture to ensure food security and realize comparative advantages took place in the agrarian sector (Shalbuzov et al., 2020) at rates exceeding those of other countries in the region and of average world indicators. Despite global shocks, the agricultural sector of the country's economy has developed a stable growth mode: the role of crop production in meeting domestic demands for many types of products has increased, and the export volume of fresh and processed agricultural products has consistently increased.

During the first stage, existing resources, including land resources, were involved in the production cycle,

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and then changes were made in the structure of the use of resources in accordance with the development strategies implemented in the agrarian sector. As a result, those changes aimed at ensuring food security and effective use of the country's competitive advantages in agriculture also had a positive impact on the development dynamics of agricultural production in general.

These structural changes could not have happened without affecting rural incomes, which is especially significant, as rural families comprise more than two-fifths of the country's population. The aim of our study is to identify the nature, direction and scale of the impact of the structural changes in question on the incomes of agricutural households. The results to be obtained in this regard are of interest in terms of a more accurate assessment of the role of factors determining the level of well-being of the population in rural areas.

This article is structured as follows: Section one introduces the research problem and section two offers a concise overview of the relevant literature. The methodological strategy is described in section three. Section four analyzes the results from the data analysis and elaborates on the empirical findings. Our research conclusions are summarized in section five. Finally, policy implications and limitations are presented in section six.

LITERATURE REVIEW

In the economic literature, several studies have researched the disparities in income levels between urban and rural areas, particularly examining the factors that influence rural incomes. These include the impact of agricultural activities on the economic well-being of rural populations. In the study conducted by the experts of the International Labor Organization (ILO) Ananian and Dellaferrera (2024) based on the data obtained from 58 countries, it is noted that the probability of employment of people living in rural areas is high, but at the same time, their wages are low. It is shown that only half of such a situation can be explained by the inconsistency in education, work experience, and professional categories between rural and urban areas. The scale of the wage gap between rural and urban areas is relatively greater in developing countries and in this case, the unexplained part is also larger (Ananian & Dellaferrera, 2024). In the studies conducted at the country level, it is shown that both the average and medina incomes in rural areas lag behind the corresponding indicators in urban areas (Musayev & Huseynzadə, 2021).

The information given in the literature shows that there is a high level of difference in income between urban and rural areas in developing economies. Thus, in India in 2011–2012, the per capita value of net added value in urban areas was 2.4 times higher than in rural areas (MSPI, 2023).

Also, the research conducted on the USA showed that even in the conditions of developed economies, there is a significant level of differences in incomes between urban and rural areas, and at the same time, the Covid-19 pandemic has an effect on the further increase of that difference (Trovall, 2023).

Recent studies testify that the digital economy has an impact on the difference between incomes in urban and rural areas. So, results of a cross-provincial study in China show that the digital economy affects the income gap between urban and rural areas through four different channels, each of which exhibits significant spatial differences. In this regard, it is possible to say that in one case, digital inequality is present in terms of the impact on the income difference, and in the other case, a digital dividend is obtained. The researchers show that the mentioned result should be evaluated as favourable information for making strategic decisions aimed at reducing the income gap between cities and villages in different regions (Xia et al., 2024).

In the literature, a central place is accorded to factors that directly improve agricultural production. The decisive factors are considered to be the gender, age, number of household members, and education, as well as the area of the country (Kalinowski, 2013). Other examples in relevant studies of individual countries also include non-agricultural ownership in households, the amount and level of use of modern

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telecommunication tools to facilitate access to market information, climate change, (Aikaeli, 2020), mechanisms of land and labor markets (Hossain et al., 2000), and low sales opportunities for products (Mustafayev, 2021).

Research on the level of household incomes in rural areas focuses particularly on the financial literacy of producers. This factor can have a positive effect on increases in rural incomes by increasing access to financial resources. Thus, the development of financial infrastructure is appropriate for the purpose of improving banking services (Gautam et al., 2022). At the same time, studies emphasize that knowledge of savings and financial investments has a greater impact on financial literacy, especially in developing countries where the poverty level of the population is high. Proposals have been put forward that would target the improvement of thrift habits in the poorer sections of rural areas (Khuc et al., 2022).

Research conducted in China also found that financial literacy effectively eases farmers' traditional credit constraints and thus promotes entrepreneurship. At the same time, risk preference weakens the positive effect of financial literacy on entrepreneurship in rural households (Liu et al., 2022).

Vu (2024) examined the impact of structural changes in Vietnam's agriculture on the income of households in rural areas, especially when agricultural producers expanded production for the market and engaged in non-agricultural activities at the same time. The results of the study show that in the country's Ha Tay province, structural changes in agriculture have led to a diversification of income sources; households are increasingly involved in off-farm activities and market-oriented agriculture, and, at the same time, these changes have created both new opportunities and challenges for rural households. On the one hand, this has helped to increase incomes and reduce poverty, but on the other hand, it has exposed households to market risks and increased inequality. Therefore, the author suggests that structural changes in agriculture must be complemented by supportive policies that ensure equal access to resources, education, and market opportunities (Vu, 2024).

Chinese researchers have focused on the impact of rural transformations on income levels in rural areas, such as the transition to the production of high value-added products, as well as the expansion of non-agricultural (non-farm) employment in rural areas (Shi & Huang, 2023). The research indicates that transformations in the areas mentioned above, covering 31 provinces of the country, were accompanied by a significant increase in household income. Therefore, accelerating rural transformations is important.

In addition, research on the structure of household income in rural North Macedonia was conducted by Kovachevikj et al. (2023). The study considered the impact of economic diversification within households in rural areas on the structure of their income and wealth. In rural areas, households with only one source of income (just from agricultural production or just from non-agricultural sources) had less financial success than households with mixed sources of income. Furthermore, among mixed-income households, households with income from agricultural production show the best financial results. Given the above, the authors emphasize that the challenge for policy makers is to determine the best mechanism for promotıng an economic portfolio for rural households with a well-balanced synergy between agricultural and non-agricultural activities (Kovachevikj et al., 2023).

As post-socialist economies made efforts to increase rural incomes relatively quickly through government-directed transformation programs, one result was a decrease in the share of wages as a share of total agricultural income and a corresponding increase in the share of social transfers (Zegar & Florianczyk, 2004).

Sudaryanto et al. (2023) also conducted research on the impact of structural transformations in agriculture and their effect on household incomes in rural areas in Indonesia. The authors show that the transition to the production of high value-added products

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in agriculture, as well as the expansion of employment in the non-agricultural sector, have a positive effect on household income, including a reduction in the level of poverty. They also emphasize the need to pay special attention to regions where the pace of change is weak, given the difference in the scale of the increase of rural incomes and the reduction of poverty due to the difference in the speed of structural transformations (Sudaryanto et al., 2023).

In the studies, urbanization is considered as one of the factors that indirectly affects the income of the population from agriculture in rural areas. In particular, it is noted that integrating urban and rural areas can increase productivity, economic growth and can also help reduce inequality between urban and rural households (OECD/European Commission, 2020). In this regard, in study carried out by example of the African countries located south of the Sahara emphasizes that the impact of urbanization is ambiguous. It is shown that urbanization creates an opportunity to free up land for agricultural producers and increase income by positively affecting the modernization of agriculture. On the other hand, if urbanization is not properly planned, it can lead to chronic poverty, low wages in rural areas, and restriction of economic growth. There is a need to implement a reform program in order to increase the positive effects of urbanization and reduce its negative effects (Sakketa, 2023). In general, in the region in question villages located closer to urban centers benefit more from urbanization due to the use of new markets. In remote areas, food security based on self-sufficiency remains a priority (Djurfeldt, 2015). In a related research on China, it was found that there is a two-way causal relationship between the urban-rural income gap and urbanization. In one case, uranization can trigger the strengthening of the gap between urban and rural areas. At the same time, the fact that incomes in rural areas are lagging behind urban areas encourages the acceleration of urbanization processes (Chen et al., 2020). Along with the, a study based on data from certain regions of China found evidence for an inverted U-shaped relationship between urban expansion and the urban-rural income gap. In this regard, it has been shown to be appropriate to implement an improved urban-rural development policy aimed at greater integration and efficiency in urban expansion (Zhong et al., 2022).

In another study related to urbanization, is found the factor of agrarian structure, more specifically, of land inequality, causes low level of wages in rural areas, raising the GNI coefficient, along with the this factor is found to increase inequality in income distribution in both rural and urban areas by encouraging excessive urbanization (Oyvat, 2016).

The literature review confirms that there has been no comprehensive study on this topic in Azerbaijan. This article presents the first exploration of the question as it relates specifically to the country.

DATA AND METHODOLOGY

Research for this article is based on data for the years 1997–2022. The source of data used in the study is the indicators of the household budget sample survey as well as the relevant official indicators from the State Statistics Committee of the Republic of Azerbaijan (SSC, 2024). The direct income of the rural population in Azerbaijan from agricultural production primarily consists of earnings from agricultural product sales and wages from agricultural labor. The direct income of the rural population in Azerbaijan from agricultural production primarily consists of earnings from agricultural product sales and wages from agricultural labor.

For the first indicator, the relevant data provided from the results of household surveys were used. The second indicator was calculated based on official statistics of the number of wage workers employed in agriculture and the average monthly wage in the agricultural sector. To render the dynamics of agricultural income, the index of income figures in nominal terms for the previous year was used as indicator.

The first indicator corresponds to the "income from farm activities" and the second indicator to the "income from agricultural wage labor," which are components of the relevant methodology on small family farms in the data portal of FAO (FAO, 2017).

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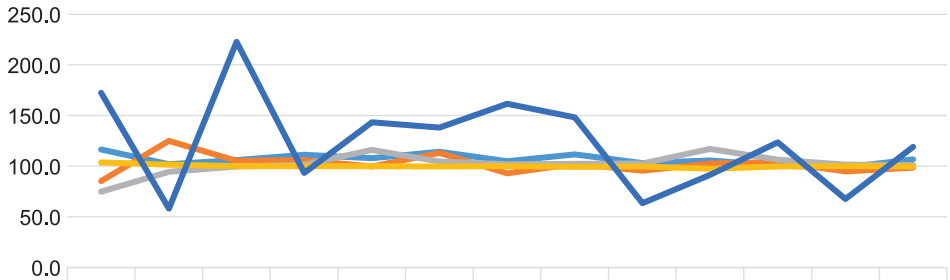
The main factors affecting the dynamics of income from agriculture are calculated from official statistics on the size of the cultivated areas, the areas of perennial crops, pasture and mowing areas, the number of livestock, as well as the volume of investments in agriculture. The annual values of the stated indicators are given in the Fig. 1.

Different types of livestock used in agricultural production are converted into a conditional head number based on the relevant coefficients (in this case, we have applied the coefficients used by the statistical institutions of the European Union countries (Eurostat, 2024). Livestock production for the period under study is in Fig. 2.

The econometric study of the relationship between the dynamics of the indices of the agricultural incomes in rural areas and the time series of the changes in the indices of the factors over the years was obtained



	1998	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018	2020	2022
IMIA*	116.6	102.1	106.2	111.2	108.0	114.2	104.8	111.8	103.2	105.7	100.6	98.9	106.7
ISAC*	85.4	125.1	105.2	106.1	99.9	113.3	92.9	102.4	95.8	102.7	104.3	95.0	98.8
IPC*	74.9	94.7	99.9	101.6	116.1	104.8	102.1	102.4	102.8	117.1	106.5	101.5	101.2
IMGA*	103.8	101.8	100.0	100.0	100.0	99.7	100.0	99.4	99.8	97.6	99.6	100.0	99.9
IIA*	172.5	58.2	222.9	93.6	143.2	138.3	161.7	148.4	63.4	91.5	123.7	67.7	119.3

* The explanation of abbreviations is given in Table 1

Fig. 1. The trends in key indicators influencing income, percent

Source: Authors' calculations based on the data of the SSC 2024.

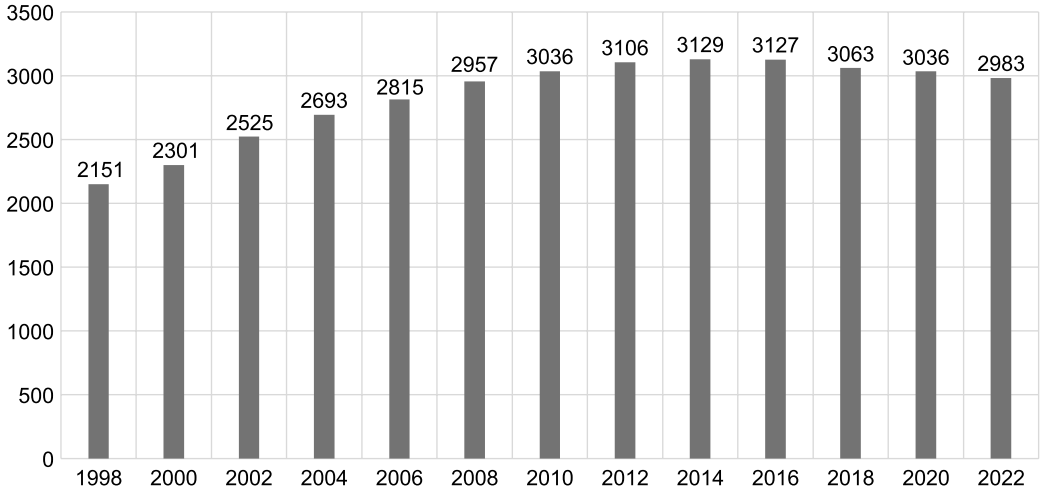


Fig. 2. The trends in livestock production in Azerbaijan from 1998 to 2022, measured in conventional units, thousand head

Source: Authors' calculations based on the data of SSC 2024.

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based on the construction of multifactor regression models. The stationarity of the series was checked at the first stage.

Tests of stationarity of time series

The stationarity of the time series variables of the data included in the study was conducted using the Stata program based on the Extended Vertical Fuller (ASDF) criterion. The results of the tests are given in Table 1.

Table 1. Results of the Augmented Dickey-Fuller (ADF) test for stationarity of variables

Variables	Results of the test		Status
	Test statistic	Critical value	
Index of monthly income per capıta from agricultural activities in rural areas, percent of the previous year (IMIA)	-3.502	-3.000**	Stationary
Index of cultivated areas of agricultural crops, percent of the previous year (ISAC)	-4.659	-3.750*	Stationary
Index of perennial plants under cultivation, percent of the previous year (IPC)	-4.243	-3.750*	Stationary
Index of pasture land, percent of the previous year (IMGA)	-4.458	-3.750*	Stationary
Index of volume of investment in fixed agriculture, forestry and fishing, percent of the previous year (IIA)	-4.191	-3.750	Stationary
Index of number of livestock (head), percent of the previous year (INA)	-0.702	-3.750	Nonstationary
Number of livestock (thousand head) (NA)	-6.046	-3.750	Stationary

*1% critical value
**5% critical value
Source: Authors' calculations using the STATA 15 program, based on application data.

As is clear from the table 1, the variables related to volumes of areas planted in crops, perennial planting areas, pasture and mowing areas, and investments in agriculture, as well as the number of livestock, are stationary, and the order of the index of change in the number of livestock is non-stationary.

Taking into account the above, the variables in the number of livestock are included in the model in conditional units.

Determination of optimal lags

In order to determine the best model, the AIK – Akaike Information Criterion – was used to determine the optimal lags in the variables. The tests were performed with Stata Software (Table 2).

Table 2. Selection of optimal lags based on the AIK criterion

Variables	Optimal lags
IMIA	0
ISAC	0
IPC	1
IMGA	1
IIA	0
NA	2

Source: Based on the calculations made by the authors in the Stata 15 software package.

Inclusion of independent variables in the model

In order to provide a favorable ratio between the number of samples and the number of independent variables in the levels of the series under study, a linear combination of three or four independent variables was considered within a model. The following two models were built:

$$IMIAt = \alpha 0 + \alpha 1\ NAt - 2 + \alpha 2ISACt + \alpha 3IMGA + \alpha 4IIAt + e1 \quad (1)$$

$$IMIAt = \beta 0\ + \beta 1IPCt - 1 + \beta 2ISACt + \beta 3IIAt + e2 \quad (2)$$

Here,

$IMIA_t$ – Index of monthly income per çapıta from agricultural aactivities in rural areas, per cent to theprevious year

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NA_{t-2} – Number of animals in terms of conventional animal units;
$ISAC_t$ – Index of sown area of agricultural crops;
$IMGA_{t-1}$ – Index of mowing and grazing areas per cent to the previous year;
IPC_{t-1} – Index of perennial area per cent tothepreviousyear;
IIA_t – Index of volume of investment in fixed in aqriculture, foresty and fishing;
$\alpha_0,\alpha_1,\alpha_2, \alpha_3, \alpha_4$ – regression coefficients for model (1);
$\beta_0,\beta_1, \beta_2, \beta_3$ – regression coefficients for model (2) mode
$e_1, e_2,$ – errors on the respective models.

Analysis of parameters of models

The values obtained for the parameters of the models usiing data for the studied period are shown in the following table (Table 3).

Table 3. Parameters of the model

Indicators	Quantity	t-statistic	p-value
On model (1)			
R-multiple	0.745205		
F-statistic	5.619862		
Significance F	0.004077		
α_0	-308.014	-2.47129	0.023677
α_1	0.013001	2.833758	0.01101
α_2	0.495939	2.940517	0.008744
α_3	3.212593	2.959927	0.008384
α_4	0.052766	4.138917	0.000616
On model (2)			
R-multiple	0.611154		
F-statistic	3.974626		
Significance F	0.022573		
β_0	131.3865	6.126329	5.5E-06
β_1	-0.34074	-2.34871	0.029229
β_2	0.04488	0.294133	0.771687
β_3	0.049321	3.119504	0.005401

Source: compiled by the authors based on relevant calculations.

Both models were evaluated using the F-statistic criterion. According to model (1), the regression coefficients of each independent variable – the livestock in conventional units (head), the indexes of areas planted in crops, pasture and mowing areas, and the index of investments are statistically reliable at the 99 percent interval limit. According to model (2), the regression coefficients of the index of perennial plantings and the index of investments are statistically reliable in the 99 percent and 95 percent interval, respectively.

Robustness Test

When assessing the adequacy of the models, the presence of serial correlation in the residuals was based on the Darbin-Watson criterion, heteroskedasticity in the residuals used the White test, and normality distribution of the residuals utilized the Shapiro-Wilk test. The results of each of the tests were as follows (Tables 4–6):

Table 4. Values of Darbin – Watson coefficient

Models	DW test quantity	Tabular value of d_u
Model (1)	1.535*	1.534
Model (2)	1.708**	1.656

*at significance level 0.01
**at significance level 0.05
Source: own elaboration.

The tests showed that there is no autocorrelation in the residuals for either model.

Table 5. White test results

Models	LM statistic	F-statistic indicator for auxiliary regression	Significance F
Model (1)	11.1792	0.93963	0.515585
Model (2)	5.4314	0.828775	0.563699

Source: own elaboration.

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The White test shows that there is no problem of heteroskedasticity in the residuals for either model.

Table 6. Results of the Shapiro-Wilk Test

Models	P-valiue	Test statistic (W)
Model (1)	0.6197	0.9671
Model (2)	0.5696	0.9649

Source: Statistics Kingdom, 2024.

Corresponding indicators for both models (with a p-value higher than 0.05), the test statistic indicators are in the acceptable region. The test statistic W equals 0.9671, which is in the 95 percent region of acceptance: [0.9142, 1]), the residuals are normally distributed.

Thus, all test results show that the models satisfy the conditions for adequacy.

RESULTS AND DISCUSSION

According to the parameters of the model, during the period under study, the changes in size of planted crop areas, pasture and mowing areas, changes in agricultural investments, as well as changes in the number of livestock, had a unidirectional influence on changes to the index of average monthly agricultural income per capita. A one percentage point increase or decrease in the index of the size of planted crop areas leads to a corresponding increase or decrease in the amount of income by 0.496 percentage points. A one percentage point change in size of pasture and mowing areas corresponds to a change of 3.22 percentage points in the amount of income. A one percentage point increase or decrease in the index of investments leads to a corresponding change in the IMIA of 0.05 percentage points.

The regression coefficient for the size of perennial planting areas has a negative sign, that is, the influence of that indicator and the index of the average monthly income from agriculture in rural areas (IMIA) moved in opposite directions. An increase or decrease in the quantity of IPC by one percentage point caused a corresponding decrease or increase in the quantity of IMIA by 0.34 percentage points.

According to the regression coefficient for the number of livestock (NA) in Model (1), every one hundred thousand head increase or decrease in the number of livestock leads to an increase or decrease in the quantity of IMIA by 1.3 percentage points.

Note that in the period under analysis there were different trends in the change in the values of individual independent variables used in the models. Thus, since the beginning of the 2000s, as a result of the crisis in transforming the agrarian sector of the economy, there has been a continuous long-term increase in the size of cultivated areas, due to the re-inclusion of fallow land. This process continued until 2009. In this period, the growth of farms was mainly through individual entrepreneurs and family (peasant) farms (see the data in Table 7). Between 2001 and 2008, this trend positively influenced the growth of average monthly per capita agricultural income in rural areas.

This positive effect was observed between 2000 and 2013 as well. However, in subsequent periods, there have been cases of reduction in cultivated areas due to short-term macroeconomic instability in the country's economy, the outbreak of the pandemic, as well as structural changes in the agricultural sector. In 2021–2022, the pre-pandemic level of cultivated area had not been regained, and in 2023, a significant decrease of cultivated area occurred compared to previous years. The impact of these factors weakened the rate of income growth.

Consistent with the aforementioned trends, various aspects have also been revealed regarding the impact of relevant factors on income dynamics (Table 7).

Table 7. Average annual indicators of the factors influencing the IMIA

Years	Average annual growth, %				
	Planted crop area	Perennial plants	Mowing and pasture area	Number of livestock (000 head)	İnvest-ments
2001–2008	3.71	4.25	-0.07	77.6	71.8
2009–2016	-0.66	4.28	-0.68	17.7	2.87
2017–2022	-0.51	3.27	-0.17	-29.0	-8.0

Source: Authors' calculations based on the data of SSC 2024.

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The structural changes implemented in agriculture in the period, in accordance with a strategy aimed at realizing comparative advantage, saw a consistant increase in the area of perennial plantings, although at variable rates, beginning in 2004. According to the data in model (2), the acceleration of the expansion in perennial plantings had a weakening effect on the growth rate of average monthly incomes from agriculture in rural areas. This can be explained by the fact that the expansion in perennial crops can be achieved more quickly in large farms than in family farms. In such a case, the income of the rural population is due primarily to wages received from wage-earning activities on those farms. The weakening effect of the increase in the expansion of perennial planting areas on growth rate of average monthly income can be explained by the fact that the growth rate of wages paid to hired farm workers lags behind the general growth rate of income in rural areas.

In Azerbaijan, state support measures have encouraged expansion of sown crops and perennial plantings, resulting in a tendency to decrease pasture and mowing areas since the second half of the first decade of the 2000s, and, according to model (1), this process has had a negative impact on the dynamics of population income in rural areas from agriculture. According to the data in Table 7, the strength of this effect is especially high in the period between the years 2009–2016. The size of the impact is estimated to be significant for the next period as well.

The number of livestock (head) in this period shows a long-term increase of 46% in 1998–2015, and this had a positive effect on the dynamics of rural income from agricultural activities. According to the data in model (1), the magnitude of the impact is especially high for the period between the years 2001–2008. At the same time, the continuous reduction of pasture and mowing areas was accompanied by a decrease in the number of animals after a certain period of time, due to the decrease in supply of fodder. The decrease in the number of animals, in turn, has become a factor affecting the growth rate of incomes, as is clear from the data in Table 7. It should be noted that the decrease in the number of productive animals in Azerbaijan has continued even after 2022, and thus this factor acts as one of the main obstacles to the growth of income from agriculture.

At the beginning of the period under study, the effect of investments in the agricultural sector on the increase of income was strong, but this effect decreased later. In 2017–2022, the investment factor weakened income growth.

Each of the factors we considered in the phase covering the relatively later years of the researched period (2017–2022) had a weakening effect on the growth rates of per capita agricultural income in rural areas. Undoubtedly this has played an important role in the sharp drop in the level of this indicator compared to previous periods.

CONCLUSION

Subsequent to the major economic crisis stemming from system transformations in the agriculture of Azerbaijan, the decades since 2000 have experienced an emphasis on recovery and revival in the agricultural sector, which has ushered in a consistent increase in the income of the rural population from agricultural activities. At the same time, in the course of these processes, especially recently, the growth in incomes from agriculture in rural areas has shown subdued growth dynamics. This weakening has resulted in a decrease in the share of these incomes in the incomes of households in rural areas. The inconsistency between the dynamics of the agricultural income in rural areas and indicators of total volume of agricultural production has increased. This situation is related to structural changes in agriculture, primarily changes in the structure of agricultural land use.

In the 2000s, Azerbaijan implemented long-term strategies for agriculture to ensure food security and realize comparative advantage in agriculture. Rates of development of the agrarian sector exceeded the indicators of the countries of the region, as well as the average world indicators. Despite global shocks, the agricultural sector of the country's economy has developed a stable growth mode, its role in meeting

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domestic demand for many types of products has improved, and the export volume of fresh and processed agricultural products has also consistently increased.

As strategies in agriculture were developed, one unfavorable effect was the reduction of pasture and mowing areas, which lessened feed supply, with a consequent decrease of productivity in the livestock sector and, after a certain limit, this led to a reduction in the number of cattle, weakening the growth rates of income from that sector and income for agricultural activities in general.

The expansion of areas planted with crops together with the reduction of pasture and mowing areas in itself acts as a factor that accelerates the income growth of the rural population. However, the opportunities this made available could not be realized since part of the arable land remained unused in recent years.

With the creation of new cropland, mainly in large farms, and intensive cultivation methods aimed at realizing comparative advantages, the income received from wages in this area, in terms of their scale and level, have not had the potential to improve the level of rural income received from agriculture in general.

POLICY IMPLICATIONS AND LIMITATIONS

Looking ahead, the necessity of harmonizing policies for expanding the production of agricultural products with the consistent solution of the issues that will ensure favorable dynamics for the incomes obtained from the agricultural activities of the rural population is on the agenda.

It will be necessary to prevent the reduction of pasture and mowing areas, as well as the tendency to decrease the number of productive animals. To restore growth, it will be necessary to implement certain measures within the framework of agrarian policy, as well as to effectively stimulate the increase of investment. At the same time, in the implementation of the strategy for the realization of comparative advantage, it will be essential to prioritize the optimization of the structure of the available land areas suitable for seasonal and perennial crops. At the same time, it will be necessary to implement effective measures to stimulate the full involvement of arable areas in the economic cycle.

In the framework of our research, it was not possible to explain in detail the mechanism of the relationship between the increase in expansion of the area of perennial plantings to the weakening growth rate in incomes obtained from agriculture. There is a need for specific research in this direction in the future.

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