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IMPACT OF SHORT- AND LONG-TERM FACTORS ON THE GROWTH OF GROSS AGRICULTURAL PRODUCTS IN AZERBAIJAN: ARDL ANALYSIS

Purpose. *The main purpose of this research is to assess the factors affecting the gross agricultural products in Azerbaijan in the short and long term.*

Methodology / approach. *This study uses an Autoregressive Distributional Lag (ARDL) model to analyse the relationship between gross agricultural output and total government expenditure on agriculture, the volume of credit used in agriculture, direct investment in fixed assets in agriculture, and the country's net agricultural exports. In our study, unlike most existing research, the variables are integrated in the second order, which increases the importance of this study.*

Results. *The results of the study indicate that, despite the "crowding in" effect created by the state budget expenditures as the main factor in the short term, the effect on the growth of gross agricultural products in the long term is not so important. Credit resources and net exports have a negative effect in this relationship. In the long term, investment in fixed capital is a crucial factor in the growth of production. In general, the positive balance of net exports is a "mirror" reflection of investments, especially innovation-oriented investments. Considering that the predominance of imports in the total demand for agricultural products significantly reduces the multiplier effect that can occur in the field in general, it minimises the multiplier effect of the total expenditure. From this point of view, foreign investments can play an important role in creating a positive balance in the trade balance of agriculture.*

Originality / scientific novelty. *The scientific value of the research is the selection of main factors as direct contributions to the growth of the gross agricultural products and their effects. Through the ARDL program, we determined what factors are short-term and which are long-term, and we analysed the causes and consequences of these dependencies and put forward relevant proposals.*

Practical value / implications. *The practical value of the research lies in the given proposals that can directly affect the net export of agricultural products and create positive changes in its balance. Because, massive investments, especially foreign investments, can modernise the rural economy in a short period of time and, accordingly, not only increase the competitiveness of its products in foreign markets, but also raise the level of self-sufficiency.*

Key words: *gross agricultural product, state budget expenditures, credit, net export, investment, ARDL.*

1. INTRODUCTION

The main goal of agricultural production in each state is to provide the country's population with necessary food products and achieve food security. According to the statistics of 2022, the population of Azerbaijan is 10.063 million people, and 35.8 % of the employed population works in the production of agricultural products, and the

share of gross agricultural products in GDP is 4.76 % (The State Statistical Committee…, 2024a). As we can see, based on the information shown above, there is a large disproportion between employment in agriculture and the share of agriculture in GDP. In developed countries, the share of employment and agriculture in GDP is approximately equal to one. For example, the agricultural employment of the United States, which belongs to the list of developed countries, was 1.66 % in 2021, correspondingly, the volume of agricultural products in the GDP was 0.95 %. Employment in German agriculture was 1.25 %, and the share of agricultural products in GDP was 0.92 %. Nevertheless, disproportion is observed in developing countries, although the difference between these indicators varies from country to country. Employment in agricultural sector in Georgia is 40.37 %, and the share of agricultural sector in GDP is equal to 5.96 %. These indicators are respectively 17.12 and 5.53 % in Turkey, and 15.00 and 5.24 % in Kazakhstan (World Bank Data, 2024). Such disproportion is applicable to almost all developing countries in the world. This is primarily a reflection of the difference between labour productivity in the production of agricultural products in developed and developing countries. The difference between the productivity of the countries is clearly reflected in how many citizens of the country, on average, can be provided with food products by one employed person. For example, simple calculations show that one person engaged in agriculture in Azerbaijan is able to produce food products for only 2.8 people in average. If we make such a calculation in other developing countries, we get almost the same result. In developed countries, this number varies between 60–80 people. However, the general trend is that as a result of innovative investments in agriculture, wide application of new techniques and technologies increases labour productivity many times and reduces the level of employment, bringing it closer to the share of agriculture in GDP. Although Azerbaijan is in the list of high middle-income countries among developing countries (OECD, 2022), the cause of such disproportion is related to the low level of labour productivity as well as the oil factor. In 2022, the GDP of Azerbaijan amounted to USD 78721.1 million. Calculations show that if we subtract the income from oil and oil products in the share of GDP, then the GDP created in the non-oil sector will be USD 36246.4 million and its share in the total GDP will be equal to 46.0 %. The share of the non-oil sector of the gross agricultural products in the GDP more than doubled to 10.34 %, which is twice as large as in Georgia and Turkey, where the oil factor does not exist. It should be noted that the amount of the total product produced in agriculture was USD 3624.6 million. This means that USD 3,600 of agricultural products are produced per person (The State Statistical…, 2024b).

It is main goal to determine the role of the short- and long-term influencing factors affecting food security and productivity for raising the level of self-sufficiency in agricultural products in our developing country. In the scientific literature, the short term period means the change of product output (supply) depending on the fluctuation of demand for it, while the long-term period is understood as the change of the supply or product output as a result of the impact of factors such as the level of saving and the role of the state (Blanchard, 2017). The

short-term period is expressed in the provision of balance in the market, and the long-term period is expressed in a concrete form in the increase of GDP.

As in other sectors of the economy, domestic farm savings, foreign capital, government spending and credit resources can be a source of economic growth in agriculture in the long-run. However, the main condition for ensuring the transition from the short-term period to the long-term period is to raise the volume of saving to the level necessary for increasing productivity in agriculture. Determining the current situation of each source in increasing the productivity of Azerbaijan's agriculture and the effects caused by their interaction is of great importance in determining the potential opportunities of the country in this field.

The main purpose of this research is to assess the factors affecting the gross agricultural products in Azerbaijan in the short and long term.

2. LITERATURE REVIEW

First, we should note that all the developing countries of the world are facing a shortage of public and direct investments (foreign and domestic) in agriculture (Fani et al., 2020). However, since agriculture is strategic in every country, the role of state budget expenditures and investments, especially foreign investments, in the economic growth of the agricultural sector and the innovative nature of this growth is decisive. In this regard, both sources are important macroeconomic factors in the development of agriculture. They facilitate access to financial and technological resources, acting as a reliable "fuel source" for economic growth in agriculture (Lowder et al., 2012). Therefore, due to the minimal level of saving within the agricultural sector, ensuring the right choice and appropriate control between public spending and investments (especially foreign) plays a fundamental role in financing the demand for investments in agriculture (Mbiakop et al., 2023).

In scientific literature at the root of the controversial issues is how government spending affects domestic and foreign investment. The main purpose of the debate is to clarify the role of public spending as a substitute or complement of private (domestic and foreign) investments. The results of studies conducted in this direction in various developing countries have been contradictory depending on the country (Bohm & Lighthart, 2014). According to some researchers, if public spending is directed to the creation and development of the infrastructure of the agricultural sector such as production of necessary public goods, especially water supply, transport and communication, education, and health, then in this case, creating fertile conditions for attracting private investments can act as a stimulus multiplier. This, in turn, is the main reason that creates the "crowding in" effect. As a result of examining the dependence between public investments and private investments in countries such as Indonesia, Malaysia, the Philippines, Thailand, Singapore, China and India in the period 1982–2016, it was concluded that the fiscal policy conducted in the agricultural sector had a positive effect in the long-term perspective. It should be noted that parameters determining the size of the capital and market, infrastructure condition and macroeconomic stability were used to determine the dependence

between investments from different sources (Othman et al., 2018). A conflicting result was also obtained in the research conducted on fiscal policy in the agricultural sector in Nigeria during 1981–2017. In this study, a low level of income tax, which is primarily a component of fiscal policy, stimulates foreign direct investment, while a high level of government spending has a negative effect (Sadibo & Adedeji, 2020).

In the period of 1991–2019, based on the ARDL model in the Republic of South Africa dependence between the parameters that affect foreign direct investments in agriculture in the long term (state spending, inflation, balance of import and export of agricultural products, effective exchange rate) were analysed. From the results of the research, it became clear that the government expenses created a "crowding out" effect in the long term, preventing the flow of direct foreign investments into the country. According to calculations based on the ARDL model, other conditions being equal, a 1.0 % increase in government spending on agriculture reduced the volume of foreign direct investment by 2.119 %. In order to attract foreign direct investments, researchers have suggested using pragmatic methods in public spending policy. In other words, it means that government spending will be directed more toward capital spending to reduce management and other current expenses and increase productivity in agriculture (Mbiakop et al., 2023).

It has been undoubtedly accepted in the scientific literature that foreign direct investment is "source" of innovation and one of the crucial factors in the modernisation of the agricultural sector, the minimisation of widespread unemployment in rural areas, the stabilisation of incomes, and ultimately the elimination of poverty (Masamba, 2017). However, practice shows that the level of foreign direct investment in most developing countries is very low for certain reasons. Due to this, filling the investment gap in the agricultural sector and stimulating foreign investments can be realised with help of state expenses (De Abreu, 2016).

However, it is interesting that the analysis of the interaction of domestic and foreign investments in African, Middle Eastern and South-East Asian countries grouped according to the level of income came to conflicting conclusions. Foreign direct investment creates two effects depending on the level of income in the country: "crowding in" and "crowding out" effect. The "crowding in" effect leads to the massive growth of foreign direct investments, playing the role of a catalyst in stimulating domestic investments of the country, especially innovation-oriented investments. If we translate the concept of "crowding in" effect into economic language, we can consider it as the multiplication of investment costs. The essence of the "crowding out" effect is that foreign direct investment becomes a competitor of domestic investment, reducing its volume and causing unemployment to increase. Empirical studies conducted in 91 countries grouped according to the level of income in the period of 1970–2000 revealed that foreign direct investments have a positive effect on domestic investments and create a "crowding in" effect (Al-Sadig, 2013). The main reason for the emergence of the "crowding in" effect is the cooperation between foreign investments and the management and technological potential of domestic investments. The main condition is the profitability of the capital. As the level of marginal return on capital increases,

foreign direct investment is further stimulated and, accordingly, increases the indicators of domestic investment, expanding the "crowding in" effect in a chain manner.

Empirical studies conducted in the non-oil countries of Southeast Asia and North Africa, where the level of income in agriculture is relatively low, have given the opposite result. An interesting result was obtained based on the empirical studies conducted in Southeast Asia and other 50 countries outside the region during the period 1990–2003. Foreign direct investments in Southeast Asian countries have created a "crowding out" effect in the short and long term, reducing the total volume of domestic investment. But foreign direct investments in other 50 countries that are not included in the region have stimulated the "crowding in" effect in the long term, despite creating a "crowding out" effect in the short term (Adams, 2009). In the non-oil countries of North Africa, the "crowding in" effect was observed in the long term (Mileva, 2008). The same result was observed in the transition period of Hungary and the Czech Republic in the 90s of the last century (Mišun & Tomšk, 2002). Such a positive tendency was also reflected in China between 1980 and 1999 (Xu & Wang, 2007). Research conducted in Pakistan and Togo in the first decade of the 21st century gave the same result (Amadou, 2011).

The concrete result of the "crowding out" effect of foreign direct investment was calculated by the least square equation method. It was identified that when foreign direct investment increased by 1.0 %, domestic investment led to 0.2 % and "crowding out" of employment by 0.1 % (Djokoto et al., 2014). Apparently, the negative relationship between foreign direct investment and domestic investment is not significant and the weakness of the relation creates a more neutral situation. The weak statistical significance of the relationship between investments gives us a reason to note that the negative effect of foreign investments on domestic investments is short-term, but the cumulative effect for the long term is positive.

Thus, from the literature analysis of the sources of increasing agricultural production, we can conclude that their dependence and mutual impact depends primarily on the profitability of the agricultural area of each country. However, these factors have a negative effect only in the short term in countries with low incomes. In the long-term perspective, it stimulates the "crowding in" effect in low-income countries by creating direct dependence. Depending on the country, there are various reasons and factors for the emergence of such adverse effects in the short and long term.

The main research question of our study is not to clarify the dilemma of whether the "the chicken or the egg" came first and which source creates the most multiplication effect in Azerbaijan, but to investigate the current state of their interaction and the possibilities of creating the "crowding in" effect at an optimal level, and their effects on the growth of the gross agricultural product.

3. METHODOLOGY

Budget expenditure, investment, credit markets and net export were selected as factors that mainly affect the growth of agricultural products. Among these factors, investment has a long-term impact, while others have a short-term impact. Short-term

factors affect the recovery of the balance in the market of agricultural products that was disbalanced as a result of changes in demand. Investment in agriculture covers the long term and determines the extent of capital saving when the relevant government policy is effective. Examining the role of each of these factors separately and the obtained results can be used in determining the direction of the agrarian policy in Azerbaijan. The main reason for the chosen methodology is to determine the parameters of the influence of short- and long-term factors. An econometric analysis is needed for achievement of this goal and therefore the Autoregressive Distribution Lag (ARDL) model (Pesaran & Pesaran, 1997) was used. The main advantage of the ARDL test is that it is possible to enter any series of data into this model without affecting the robustness of the model in any way. That is, variables I(0), I(1), or mutual cointegration (connection) are possible in this model. In many studies where the ARDL test is applied, the authors tend to integrate the main variables in the first order. In our research, the variables are integrated in the second order, which increases the importance of this study. Used materials have been collected according to the criteria of the model.

3.1. Material. In order to achieve the empirical goals, practice it in the study, data collected from various available sources were used. These data, which consist of a time series by years, cover a period of 15 years (2008–2022). Due to the lack of information on Azerbaijan on many variables until 2008, the research purposefully starts from 2008. It should also be noted that the fact that the data cover recent years increases the importance of the study.

The following sources of information were used: 1) data on the gross agricultural product and investment variables directed to agricultural fixed capital were taken from the State Statistical Committee of the Republic of Azerbaijan (ARSSC); 2) amount of credit used in agriculture by years (AR Central Bank); 3) data on the amount of state expenditures allocated to agriculture from the general budget and the amount of export and import of agricultural goods for the country were taken from the Food and Agriculture Organization (FAO) database (FAOSTAT, 2024a; 2024b); 4) the service materials were received from the Ministry of Economy.

3.2. Model specification. Due to the non-use of foreign direct investment in the growth of the production of agricultural products of Azerbaijan, the expenses allocated from the state budget are important in this process, and accordingly, the assessment of its impact is taken as a basis. To ensure the robustness of the model, other variables such as the credit market, domestic investment, and trade balance that may affect this relationship were added. The main research question is whether the effect of government spending on gross agricultural output is "crowding in" or "crowding out" in nature (Makuyana & Odhiambo, 2016). To answer this question, the model is formulated as follows in equation 1:

$$GPVA_t = \alpha_0 + \alpha_1 GEX_t + \alpha_2 CRTA_t + \alpha_3 \dot{I}NVTA_t + \alpha_4 NEXP_t + \mu_t\,, \quad (1)$$

where α_0 is a constant variable and μ_t is the error term of the model;

GPVA is a gross agricultural output, million USD;

GEX is a total state budget expenditure on agriculture, million USD;

CRTA is an agricultural credit loans, million USD;
INVTA is a direct investment to the fixed capital of agriculture, million USD;
NEXP is a net export of agricultural products, million USD;

Since the variables in the above model are given in the same unit (million USD), they do not have the problem of non-linearity, and therefore there is no need to transform the variables into a logarithm.

3.3. ARDL analysis: ADF and PP tests. Based on the empirical analysis we conducted during the research, we can note that we used three main tests: Unit Root test, Autoregressive Time Distribution test and Granger causality test. According to the conducted analysis, we can say that the results confirm most of our theoretical considerations. According to the results of the analysis, we tried to form a fully suitable model and make a clear theoretical justification for it.

The first thing to consider is the correct distinction between short-term and long-term relationships according to the variables chosen here and the correct construction of the model. For this reason, the impact of each independent variable on the dependent variable in the short and long term is given separately in equation (2) and checked with tests:

$$\Delta GPVA_t = \alpha_0 + {}_{i=1}^{m}\Sigma\alpha_{1i}\Delta GPVA_{t-i} + {}_{i=0}^{m}\Sigma\alpha_{2i}\Delta GEX_{t-i} + {}_{i=0}^{m}\Sigma\alpha_{3i}\Delta CRTA_{t-i} + \\ + {}_{i=0}^{m}\Sigma\alpha_{4i}\Delta NEXP_{t-i} + {}_{i=0}^{m}\Sigma\alpha_{5i}\Delta INVTA_{t-i} + \alpha_6 GPVA_{t-1} + \alpha_7 GEX_{t-1} + \\ + \alpha_8 CRTA_{t-1} + \alpha_9 NEXP_{t-1} + \alpha_{10} INVTA_{t-1} + \mu_t. \quad (2)$$

It should be noted that it is very important to distinguish the general state budget expenditures on agriculture, which we have selected and included in the model, and investments in fixed capital in agriculture. Because the state's budget expenditures on agriculture are focused on the economy for a short term and their effects also become apparent in a short term. However, if we emphasize the investment in fixed capital in agriculture, we can say that this variable shows its effect only in the long run. In addition, in the model we built, this "rule" spoke for itself, and the investment in fixed capital in agriculture (INVTA) had no effect on the gross agricultural product (GPVA) in the short term. However, in the long run, this variable has a large impact on the GPVA. It is important to note that there is a problem of multicollinearity (hidden relationship) between INVTA and trade balance, and for this reason we cannot show INVTA in the same model as other variables in the long run. Therefore, to find confirmation of our assumption, we presented GPVA and INVTA variables as separate models. Functionally, this model is described as follows in equation 3:

$$\Delta GPVA_t = \alpha_0 + \alpha_1 INVTA_{t-1} + \mu_t, \quad (3)$$

where Δ is first difference of variable; μ_t is the error term.

4. RESULTS

4.1. ADF and PP unit root tests. In the first step, the tests were analysed. Let us start with the unit root test first, because this test tells us whether our chosen variables are stationary. ADF and PP tests were used during the research. The null and alternative hypotheses of both these tests are formulated as follows:

H_0 : the variable is not stationary;

H_a : the variable is stationary.

Thus, as can be seen from Table 1, according to the results of the ADF test in order I(2), the variables are statistically significant and stationary at all three (1 %, 5, 10 %) levels of statistical significance. However, according to the results of the PP test, each variable in row I(2) is statistically significant and stationary at the 1 % level of significance. As a result, each selected variable can be used in building the ARDL model.

Table 1

The outputs of ADF and PP unit root tests

Variable	Level		First Difference		Second Difference	
	ADF	PP	ADF	PP	ADF	PP
GPVA	1.0127	1.0127	-3.1891	-3.2322	-3.5386*	-7.9729***
CRTA	-1.9638	-1.5187	-2.6636	-2.5650	-3.7486**	-6.1908***
GEX	-2.6873	-2.6873	-2.7842*	-4.0567**	-3.2421**	-7.4077***
INVTA	-3.3396**	-2.1330	9.0411***	-2.8092*	-6.2521**	-5.3521***
NEXP	-0.9190	-0.9190	-4.7760***	-4.7549***	-7.7489***	-9.6115***

Note. In the ADF and PP unit root tests, these numbers indicate t-statistics, and asterisks (*, **, ***) denote statistical significance at 1 %, 5 and 10 % levels respectively.

Source: authors' calculation.

4.2. Cointegration test. In the next step, a cointegration test was conducted with the variables selected based on the ARDL model. The results of this test are shown in Table 2. Here, the coefficient indicates the direction of the relationship, and the p-value indicates the probability of the variable having an effect on the dependent variable in the model. Here, the null and alternative hypotheses are formulated as follows:

H_0 : there is no effect of the independent variable on the dependent variable;

H_a : there is an effect of the independent variable on the dependent variable.

As can be seen from the Table 2, there is an effect of government budget expenditure on agriculture (GEX), amount of credit to agriculture (CRTA) (-1) and net export (NEXP) on gross agricultural product (GPVA) at 5 % significance level and thus we accept the alternative hypothesis.

Table 2

The findings of ARDL cointegration test

Independent variable	Coefficient	P-value
Constant	-817.1657**	0.0177
GPVA (-1)	0.4422	0.1762
GPVA (-2)	0.5070	0.2125
GEX	1.3747**	0.0361
CRTA	0.5353	0.1350
CRTA (-1)	-1.4021***	0.0034
NEXP	-0.0012**	0.0170

Note. **, *** denote statistical significance at 5 % and 10 % levels respectively.

Source: authors' calculation.

Based on Table 2, the ARDL model results can be considered as follows. When government expenditure on agriculture (GEX) increases by 1 unit, the gross agricultural product (GPVA) increases by 1.37 units. When the amount of

agricultural credit (CRTA) increases by 1 unit, the gross agricultural product (GPVA) decreases by 1.40 units. When the negative balance of net exports increases by 1 unit, the gross agricultural product (GPVA) decreases by 0.001 units. The reasons for the different impact of each factor on the growth of the total agricultural output reflected in Table 2 analysed in detail below.

4.3. Granger causality test. The cointegration test only analyses the one-way relationship, and unlike it, the Granger analysis determines the mutual relationships between two variables. As with all tests, the Granger causality test has a null hypothesis and is defined as:

H_0 : variable X is not a granger cause of variable Y;

H_a : variable X is a granger cause of variable Y.

Table 3 shows the results of the Granger causality test. Thus, according to the test, only the impact of state budget expenditures in agricultural sector on the gross agricultural output is statistically significant at the 5 % level of significance. In this case, we reject the null hypothesis and accept the alternative hypothesis. However, this effect is one-sided, and the reverse interaction does not exist. In all other variables, Granger causality is not observed.

Table 3

The findings of the Granger Causality test

Null hypothesis	F-statistic	Prob.
D(CRTA) does not Granger Cause D(GPVA)	0.54440	0.6029
D(GPVA) does not Granger Cause D(CRTA)	0.79746	0.4875
D(GEX) does not Granger Cause D(GPVA)	5.75330	0.0333
D(GPVA) does not Granger Cause D(GEX)	0.56727	0.5911
D(INVTA) does not Granger Cause D(GPVA)	1.95249	0.2119
D(GPVA) does not Granger Cause D(INVTA)	0.36190	0.7087
D(NEXP) does not Granger Cause D(GPVA)	0.16673	0.8497
D(GPVA) does not Granger Cause D(NEXP)	1.72918	0.2453

Source: authors' calculation.

Thus, there is no direct or inverse relationship between agricultural loans, net exports and investments and total agricultural products.

4.4. Analysis of short- and long-term periods. It should be taken into account that the factors analysed here have different impact depending on the short and long term. For this reason, in order to ensure the robustness of the test, it is necessary to test the effect of the analysed factors in the short and long term (Table 4).

Table 4

The short- and long-term analysis

Short-term analysis			Long-term analysis		
Variable	Coefficient	P-value	Variable	Coefficient	P-value
Constant	-817.1657	0.0004	CRTA	-17.1004	0.6606
D(GPVA)(-1)	-0.5070	0.0274	GEX	27.1226	0.6789
D(CRTA)	0.5353	0.0124	NEXP	-0.0247	0.6183
CointEq(-1)	-0.0501	0.0001	INVTA	-0.9708	0.0354

Source: authors' calculation.

As can be seen from Table 4, the short- and long-term separate effects of the above-mentioned variables were analysed and it was determined that the effect of gross agricultural output and loans on gross agricultural output in the short term is statistically significant. In the long term, only direct capital investments have a statistically significant effect on the gross agricultural output from the conducted analysis, it can be concluded that it is necessary to analyse the long-term impact of the investment separately.

4.5. Analysis of factors affecting the gross agricultural products.

Budget expenses. First, it is necessary to distinguish between state investments and state expenditures in the state funds allocated to agriculture from the budget. The purpose of state investments is the formation of infrastructure in agriculture, purchase of transmission devices, machines and equipment, major repair of devices, conducting scientific research and experimental design works, construction of irrigation systems, etc. Such role of public investment is stimulating and complementary to the private sector that creates value addition in agriculture. Government expenses cover primarily subsidies allocated from the budget, tax benefits, transfers, management costs, insurance, purchase prices and other directions. The purpose of government spending is to minimise farmers' losses and stabilise their incomes. Thus, public spending is short-term, while public investment is long-term.

According to the World Trade Organization (WTO) classification of state agricultural support measures, the measures are divided into "yellow basket", "green basket" and "blue basket" groups. The criterion for allocating measures to these baskets is whether the state support distorts the production and trade of the products.

"Yellow basket" refers to the system of measures that directly and indirectly affect the price and cost of the product. The "yellow basket" includes measures that have little effect of state support and distort reality. Subsidising agriculture, price support, subsidising the interest rate of the loan, compensation for electricity, fuel and motor oil, etc. are related to such measures. The main goal of the system of measures included in the "yellow basket" is to stabilise incomes in the short term and minimise the risks for restoring balance in the market of agricultural products.

"Green basket" refers to the system of measures that do not distort reality in agricultural production and trade, and these measures can be used without restrictions. The group of measures included in this basket include supporting the institutional development of the field, construction of agricultural infrastructure, conducting scientific research, application of innovative technologies, combating pests in agriculture, payments for damage caused to farmers (insurance), and etc. The goal of the "green basket" measure system is the increasing of agricultural products in the long term with help of affecting to the level of saving.

"Blue basket" is a system of measures aimed to limit arable land in order to prevent an excessive increase in crop production and limiting the number of animals in animal husbandry. The system of such measures includes subsidisation in order to limit the volume of the product, application of quotas to the production process etc.

(World Trade Organization, 2004).

Although Azerbaijan is not a member of the WTO, we can apply the classification of the system of state support measures adopted by it to the reality of our country. "Blue basket" is not relevant for Azerbaijan's agriculture, because the goal of the agrarian policy and state support is to increase the total production of agricultural products and create a level of self-sufficiency. For this reason, the policy of limiting the production of agricultural products is not implemented in Azerbaijan. However, very interesting situation arises if we would classify the state support measures of agriculture according to "yellow and green baskets".

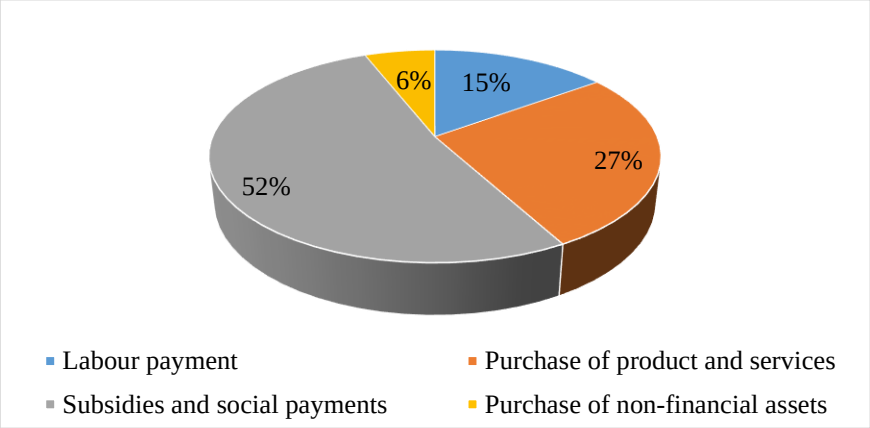

Figure 1. The structure of the implementation of expenses from the state budget by sections in agriculture in 2022, %

Source: composed by the authors based on (Ministry of Finance…, 2023).

As seen from Figure 1, subsidies and social payments, the purchase of products and services, and the expenses directed to the payment of labour make up 94 % of the expenses allocated to agriculture from the state budget. Direct investments aimed at creating non-financial assets are equal to 6 % in total. From the conducted classification, we can conclude that 94 % of the funds allocated from the state budget for measures to support agriculture are directed to the "yellow basket". According to our calculations based on statistical data, the share of state investments in the total capital investment in agriculture is about 13 % (Ministry of Finance …, 2023). As it can be seen, although state investments are reflected in budget expenditures, they do not have a great role as a source of investment. Measures belonging to the "yellow basket" group are economically ineffective according to the WTO classification. This is because the government expenditures in this direction serve more to manage risks and stabilise incomes (Vigani et al., 2024). Such government policy is short term in nature and serves to maintain balance in the agricultural market. It is no coincidence that according to the results obtained from the program, a 1-unit increase in budget expenditures increases the gross agricultural output by totally 1.37 units, and this increase is due to changes in demand in domestic and foreign markets. While 1-unit increase in investment increases the gross agricultural output by 2.14 units. In order to achieve qualitative change in the agricultural field through investment, the measures belonging to the "green basket" group should be prioritised in the state agrarian policy.

Investment. Below mentioned idea is supported by our analysis in the program. As can be seen from Table 5, the F-statistic is greater than the upper and lower bounds at the 10 % significance level. Thus, according to the conducted cointegration test, it is possible to say that the impact of investments on the gross agricultural product is long term, and the test accordingly confirms this idea.

Table 5

Bounds test for nonlinear cointegration

Independent variable	F-statistics	90 % lower bound	90 % upper bound	Conclusion
INVTA	108.38	5.59	6.26	Cointegration

Source: authors' calculations.

As can be seen from Table 6, since the impact of investment on the gross output of agriculture is significant, we have given the impact of investment on gross output of agriculture separately in the long term. Based on the result, we can see that the effect of investment and gross agricultural output is statistically significant. At the same time, it is important to note that the significant correlation of investment with the gross agricultural product in different periods, that is, in the long term, intensifies the effect of the gross agricultural product on itself and creates an "acceleration" effect. The "acceleration" effect is explained by the fact that in the long term, the growth of agricultural products has a direct impact on the growth of farmers" incomes and the level of savings by further stimulating investments.

Table 6

The long-term relationship between investment in agriculture and gross product value of agriculture

Long-term analysis		
Variable	Coefficient	P-value
Constant	-3761.292	0.0011
TREND	-394.8186	0.0009
GPVA (-1)	2.213906	0.0007
INVTA (-1)	2.149371	0.0432
D(GPVA) (-1)	-3.276086	0.0014
D(GPVA) (-1)	-1.480010	0.0062
D(INVTA)	2.825890	0.0025
D(INVTA) (-1)	1.186839	0.0377
D(INVTA) (-2)	0.299997	0.3778

Source: authors' calculation.

Credit market. It should be noted that the share of the state in the total amount of contracts concluded on securities (stocks and bonds) in the Baku Stock Exchange of Azerbaijan, which is a part of the financial markets, was 79.2 % in 2022 (Central Bank, 2023a). This means that the main participant of the securities market is the state. Such active participation of the state in the securities market creates a "crowding out" effect in all areas of the economy. The absolute superiority of the state in the securities market in Azerbaijan means that the saving of already limited financial resources is focused on closing the budget deficit instead of transforming them into the economy, including agriculture, and investments. On the other hand,

the small size of farms becomes an inevitable obstacle in their access to financial markets.

As for that, the situation in crediting agriculture by banks and non-bank credit organisations is unsatisfactory. One of the main sources of investment in developing countries, as well as in developed countries, is the credit market. The level of credit market development is one of the main "barometers" of the level of country development. State and private banks, including banks with foreign capital, and non-bank financial institutions deal with the supply of credit resources in the financial markets of Azerbaijan. If we analyse the structure of bank and non-bank financial institutions loans to the economy by sector, it becomes clear that during these periods, the share of agriculture in the composition of bank loans to the economy changed in the range of 2.5–4.0 %. It is interesting that the share of total loans directed by banks and non-bank financial institutions to the trade, service and household sector has steadily increased over the years and reached 72 % (Central Bank, 2023b). This means that short-term consumer loans in Azerbaijan crowd out long-term investment loans and weaken the pace of economic growth in general. The reason is that the interest rate of short-term consumer loans is high and the level of risk is low. During the analysed years, the average interest rate for a short-term loan varied around 14–20 %, and the lowest level occurred in 2022 (World Bank Database, 2024). Farmers' access to credit resources is considered as a consumer credit, and in most cases, it is used to fill the financial gap created in farms. At the same time, the high level of interest rates for the loan deepens the financial problems of the already low-income farmers. For this reason, the statistically significant dependence between the growth of the gross agricultural product and credit resources creates an inverse proportional relationship in the short term. It is clear from Table 2 that a 1-unit increase in credit resources reduces agricultural output by 1.4 units, other conditions being equal. We can conclude that, if the current trend in the structure of crediting continues, this sector will not be able to act as a source of finance for agriculture, creating a "crowding out" effect.

Net export. One of the findings from our ARDL program is the short-term negative impact of net exports (trade balance) on gross agricultural output. Although, as can be seen from Table 2, the relationship is statistically significant, but the degree of impact is 0.001 units and is weak. The reason for this negative relation is the negative balance of net exports (trade balance). It can be noted that during the period of independence, the trade balance of agricultural products of Azerbaijan has been negative and the trend of the negative balance continues to increase. If the negative balance of net export of agricultural products was USD 628,256 million in 2008, this figure has increased almost 3 times in 2022 and reached USD 1530.1 million. For comparison, let us note that in the same year, the import of agricultural products in neighbouring Georgia with a population of 3712 thousand people was USD 1764.7 million, and the export was USD 1213.5 million, and the negative balance in the trade balance was equal to USD 551 million (FAOSTAT, 2024c). Although the production of agricultural products increased 3 times during the period 2008–2022, the negative

balance of agricultural products in the trade balance of USD 1530.1 is an indicator of the competitiveness weakness of the country's products and the level of self-sufficiency is not very high (The State Statistical Committee…, 2024c). Although 100 % self-sufficiency has been achieved for certain products (fruits, vegetables, eggs, etc.), the list of these products is very limited.

5. DISCUSSION

According to our analysis in the program, expenditures allocated from the state budget and direct private investments have a positive effect on the growth of the gross agricultural product, while credit and negative net exports have a negative effect. Our main goal in this part of the study is to investigate the conflicting effect of the factors and put forward relevant proposals in the conclusion section.

Budget expenses. Although the budget spending policy belongs to the "yellow basket" group of measures, it has the highest statistical significance among other factors in the growth of gross agricultural products according to the Granger coefficient. As it is known, budget expenditures are the tools of fiscal policy that regulates fluctuations in the economy in the short term. However, one of the other important instruments of the fiscal policy is the tax and together with the budget expenditure instrument complement each other in the area.

Azerbaijan's policy of tax holidays in the field of agricultural production can also be attributed to the "yellow basket". Because the tax for any economic firm is primarily a component of its production costs. One of the main premises of the Keynesian theory is that tax is not only a tool that provides budget revenues, but also a regulatory mechanism that stimulates investment. However, when economic subjects are completely exempted from taxation, tax cannot be used as a tool influencing the behavior of subjects, and accordingly, it loses its efficiency by turning fiscal policy into a "single arm". From this point of view, "tax holidays" do not only fail to ensure budget revenues, but also lose their essence as a mechanism for regulating the economy. The purpose of the tax holidays implemented in Azerbaijan's agriculture is to stabilise farmers' income and ultimately direct it to investment. Nevertheless, the reality is that, as we mentioned above, 90 % of the agricultural products of Azerbaijan are produced in small farms (individual, family farmers and households) (The State Statistical Committee…, 2024c). The main condition that stimulates investment is the creation of a positive scale effect in the long run. It is enough to say that 88.7 % of the 432,000 farmers currently operating in the field of vegetable cultivation in Azerbaijan have arable land area of up to 3 hectares, which is 56 % of privately owned land (Ministry of Economy…, 2020). A positive scale effect occurs as a result of a decrease in average production costs as the size of the farm increases. It is impossible to achieve such a process within the framework of small farms. As a result, instead of becoming a source of investment, tax benefits are used as a "security pillow" in the form of savings and are "fed" for the "dark day". Tax holidays have distorted reality and become a self-insurance mechanism instead of a source of investment. We believe that in order to stimulate

investment and increase the efficiency of the "crowding in" effect, tax holidays should be replaced by a policy of tax incentives. The working principle of tax benefits should be based on the complete tax exemption of the part of the remaining profit spent on investment under the condition that a predetermined amount of profit is exempt from tax to meet the consumer needs of economic entities. In other words, the slogan of the preferential tax policy should be "only the lazy will pay the tax". However, for this policy to be successful, it must be linked to reforms of property institutions. It is enough to note that the share of the private sector in total land areas suitable for agriculture is 34.5 %. The state and municipalities owned the remaining part of land suitable for agriculture (Ministry of Economy…, 2021). There is a great need for institutional reforms in land ownership to accelerate the economic growth of agriculture. The efficiency of the existing institutions is not very high and creates more obstacles in increasing the added value. It should be noted that this situation is typical for many developing countries. Effective management of land resources is the most important institutional dimension in the formation of added value in agriculture (Gelgo et al., 2023). Studies show that strengthening land ownership increases the benefits of farmers' investments in agriculture (Haldar & Sethi, 2022).

The main goal of property reforms in an institutional nature is the transformation of small farms into large ones based on the development of the land market. Because the positive scale effect can be realised only in medium and large farms. Although state programs have been adopted in Azerbaijan for the creation of large cooperative enterprises and agro-firms, but due to the weak development of the land market, their number has not increased significantly and they do not have a strong impact on the growth of agricultural production (Law of the Republic of Azerbaijan, 2006). Research shows that when the quality of institutional reforms is high, public spending has a positive and significant effect on agricultural production. Conversely, in countries with low institutional quality, public spending does not have a significant impact on output (Soko et al., 2023).

One necessity of carrying out property reforms on agricultural land is to significantly stimulate foreign investments in Azerbaijan and expand the "crowding in" effect in agriculture in general. It should be noted that the incentive measures applied to local farmers within the framework of the agrarian policy in Azerbaijan are also applied to foreign investors. However, the share of foreign direct investment in the total investment in fixed capital of agriculture was equal to zero during the analysed years. The reason is that the strong position of the budget policy in the "yellow basket" group creates a "crowding out" effect for foreign direct investments. The literature analysis showed that such a situation is more characteristic to thee major African countries, especially the Republic of South Africa. It is interesting that foreign direct investments in agricultural sector of Georgia and Armenia, neighbours of Azerbaijan in the South Caucasus region, were made regularly in the last 15 years (2007–2022) and varied from USD 5 million to 36 million. Foreign investment in Azerbaijan's agriculture is usually implemented by donor organisations within the framework of certain projects. The main purpose of the investments made within the

framework of these projects is to support logistics services and is not directed to fixed capital. Although today, unique "offshore oases" have been created in Azerbaijan's agriculture, but in our opinion, the unattractiveness of such "oasis" for foreign capital is primarily due to institutional factors. For this reason, the transition of the fiscal policy in the agricultural field from the "yellow basket" to the policy of "green basket" measures that primarily stimulate investments can play an important role in solving this problem. Because, as can be seen in our analysis, the "yellow basket" creates a "crowding in" effect for local producers in the short term, but creates a "crowding out" effect for foreign capital in the long term. Thus, the over-emphasis on government spending to achieve production growth in agriculture will lead to other problems in the long term. It should be noted that this idea has been confirmed in many developing countries (Matchaya, 2020).

Investment. The leading role in capital investment belongs to the private sector and, accordingly, its specific weight is equal to 87 %. However, despite the high share of the private sector, its specific weight in total investment is very low. In modern literature, the development path theory of investment in agriculture is divided into several stages (Agyeiwaa-Afrane et al., 2024). In the first stage, the investment in agriculture takes place due to public expenditure, and in the second stage, the share of the private sector increases. The third stage is characterised by the flow of foreign direct investments into the country. It is clear from this theory that Azerbaijan is currently in the second stage. In the long term, stimulating foreign direct investments can play an important role in accelerating the multiplication-acceleration effect in the agricultural sector and, accordingly, in the transformation of economic growth in agriculture into an innovative form.

As a result of the analysis of the world experience, it has been unequivocally accepted in the modern scientific literature that foreign direct investment in developing countries has a leading role in the economic growth of each country in reducing unemployment, creating a positive balance in the trade balance and in general economic development (Hasanov et al., 2019; Adegboye et al., 2020; Ogundipe et al., 2020; Osabohien et al., 2020). The need to stimulate foreign investments is also related to the fact that the possibilities of a development strategy based on advanced knowledge and technological advantages are very limited in the production of agricultural products. In developing countries, this reality makes agriculture a lagging sector, and it is rarely the focal point of innovation policy. (Knudson et al., 2004; Andrade et al., 2020). As a result, agricultural enterprises, in most cases, do not act as creators of innovation, but act as a party that accepts innovations in a ready form, and become mainly consumers of such products. Unlike other sectors of the economy, agriculture has very limited ability to innovate by itself. Agricultural enterprises mainly prefer the transfer of knowledge and technology from other sectors (Clancy et al., 2019; Álvarez-Coque et al., 2012). On the other hand, the practical application of sustainable innovation policy in production and trade (e.g., innovative financial solutions, increasing the value chain through the use of innovative technologies, etc.) plays a leading role in accelerating development

(Osabohien et al., 2020). At the same time, foreign direct investment has a direct positive effect on the increase of agricultural production in the future and, accordingly, on the formation of investment sources (Li et al., 2024). From the systematic diffusion point of view of innovations in Azerbaijan's agriculture, foreign direct investment can create the "cornerstone" effect in this process.

From the literature analysis, it was concluded that foreign direct investment can create both "crowding in" and "crowding out" effect in agriculture, depending on the country. However, the fact that foreign direct investment in Azerbaijan is equal to zero means that it does not create either a "crowding in" or a "crowding out" effect. In our opinion, if the appropriate state policy is implemented, foreign direct investment can create more "crowding in" effect.

Foreign capital and the private sector can use two sources of capital investment in agriculture: private funds and financial markets. It should be taken into account that the absolute predominance of small farms in Azerbaijan indicates their low level of profitability and, accordingly, they cannot raise capital saving to the necessary level due to their personal income. Therefore, the role of financial markets in this process is more interesting.

Credit market. In order to radically change the current situation, credit markets should become one of the main instruments that stimulate investments in the long term. In practice, such a credit system has been implemented in the Republic of Turkey for a long time. The main activity of "Ziraat" bank, which was created by the state in the second half of the XIX century and operates to this day, is to finance existing and newly created farms and to stimulate investment in agriculture. Although "Ziraat" bank is a commercial bank, its main goal is to provide farmers with low interest production and investment loans (Kaya & Kadanalı, 2020).

We believe that in order to increase investments in agriculture in the long term, the state should establish a specialised agricultural bank in this field. The main goal of the bank is to ensure the widespread use of long-term concessional loans to farmers. The main principles of the bank's activity should be defined and regulated by the state.

Net export. It should also be noted that according to the hypothesis proposed in the scientific literature, the export of agricultural products has become a topic of discussion as one of the main reasons for the increase of the total agricultural product by increasing the total demand for it. However, the investigation of the correlation in the empirical relationship between the growth of agriculture and the export of its products has not been fully analysed yet. Among the developed countries, such rare analyses were conducted in China (Seok & Moon, 2021; Ahmed & Sallam, 2018). Among the developing countries, Egypt and South Africa were the object of analysis (Ahmed & Sallam, 2018; Bulagi et al., 2015). The main result of the research is that the correlation between the growth of the total agricultural product and its export is not very convincing. A study conducted by E. Mamba and E. Ali in 14 countries of the sub-Saharan West African region in the period 1996–2018 concluded that neither complementarity nor substitution relationships exist in the growth of agricultural

output with the net exports of these countries. Although net exports have a positive effect on agricultural output growth, the dependence between them is weakly significant (Mamba & Ali, 2022).

Our ARDL analysis shows a weak correlation between net exports and agricultural output growth. Even the negative balance in the trade has a very weak and almost neutral effect on the production of agricultural products. This indicates that the correlation between net export and agricultural output is more neutral and, accordingly, does not become the cause of either "crowing out" or "crowning in" effect. In our opinion, the reason for this situation is that currently the total volume of production of agricultural products is lower than the total demand for it and the level of complete self-sufficiency is minimal. However, as the level of self-sufficiency increases and domestic demand is fully satisfied, in this case, the future growth of agricultural products can only occur due to the increase of net exports. This means that the correlation relationship between these two variables can be significant. In order to create such a significant correlation, it is necessary to ensure the transition of the field to a long-term period through the implementation of the above-mentioned measures.

6. CONCLUSIONS

Our main goal in this article was to evaluate the impact of short- and long-term factors on the growth of total agricultural products. From the analysis carried out in the ARDL program, we can draw such a general conclusion that the government expenditures directed to agriculture have a positive effect in the short term and create a "crowding in" effect. However, in the long term, government spending is not able to create an investment effect. Since bank loans are not long-term investment, but rather consumer loans, they have only a short-term effect, and this effect is negative. These two short-term factors, in turn, create a negative balance in the trade balance of agricultural products, significantly reducing the impact of net exports, neutralising it at best.

Direct investments in long term fixed capital can affect the net export of agricultural products and create positive changes in its balance. Because, mostly investments, especially foreign investments, can modernise the rural economy in a short period of time and, accordingly, not only increase the competitiveness of its products in foreign markets, but also raise the level of self-sufficiency. In general, the positive balance of net exports is a "mirror" reflection of investments, especially innovation-oriented investments. Given that the predominance of imports in the total demand for agricultural products significantly reduces the multiplier effect that can occur in the field in general, it minimises the multiplier effect of the total expenditure. From this point of view, foreign investments can play an important role in creating a positive balance in the trade of agricultural sector.

From the ARDL analysis of the impact of short- and long-term factors, we can come to such a short conclusion that the growth of total agricultural production should be transferred from the short-term period to the long-term period. For this

reason, the share of investment in budget expenditures should be increased. Government spending on agriculture should be focused primarily on institutional reforms with the aim of creating a fertile investment environment.

In order to eliminate the negative impact of the services of commercial banks, we believe that there is a need to create a specialised agrarian bank that finances agriculture in the long term and is controlled by the state. The main activity of such a specialised bank should not be of a commercial nature, but should be the stimulation of investment in agriculture at the expense of low-interest loans. Turkey's experience can be widely used in the creation of such a bank.

These proposals primarily cover the macro level. The main direction of increasing the investment opportunities of farms operating at the micro level should be the transformation of small farms into large farms. The fact is that the predominance of small farms increases the intensity of competition in the market of agricultural products and causes a disruption of the market balance in the short term. The main method of preventing the disruption of the market balance in the short-term period and ensuring the transition to the long-term period is the development of the cooperative movement. It should be noted that during the period of independence, the number of agricultural cooperatives in Azerbaijan regularly decreased. The reason is that all existing cooperatives are of a production nature. The main method in this direction is to create a cooperative of them as service cooperatives rather than production cooperatives. The advantage of service cooperatives over production cooperatives is that they minimise operational costs (equipment and its service, fuel, lubricants, mineral fertilisers, seed supply, information and marketing services, etc.) while maintaining the economic independence of farmers and making independent decisions within the cooperative. Service cooperatives primarily serve to reduce transaction costs and are the main cause of external positive scale effects. The latter is an important indicator of the long-term period (Decree of the President …, 2017).

Thus, the state policy calculated for the short-term period can achieve temporary results. In order to ensure the transition to the long-term period, the policy conducted at the macro level must be completed at the micro level. Since short-term growth may be accompanied by a decline in subsequent years, and such cases have occurred in the periods we analysed. Figuratively speaking, the overall increase in gross agricultural output should be a "marathon walk" and not a "turtle walk".

7. LIMITATIONS AND FUTURE RESEARCH

Our ARDL analysis only covers the last 15 years. The quality of the research would be higher if the dynamics of the analysis of the factors influencing the growth of agricultural products covered a longer period (25–30 years). Unfortunately, the available local and international data sources only cover the years 2008–2022, and it is not possible to obtain data from earlier periods. Another limitation is that agricultural research expenditures were not reflected in our article. Research costs are the main factor that directly affects labour productivity. Another limitation is that foreign direct investment in agriculture is equal to "zero". This makes it impossible to

determine the "crowding in" effect that it can create in increasing the total agricultural products.

The analyses carried out in this manuscript can play a key role in the investigation of many problems existing in Azerbaijan's agriculture. For example, increasing the competitiveness of agriculture, financing it along the value chain, etc. can be a clue in the research of such problems. It is intended to use many of the results of this work in our future research aimed at investigating these problems.

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