

QUANTITATIVE ASSESSMENT OF THE IMPACT OF STATE POLICY ON COMPETITIVENESS OF AGRICULTURE IN THE REPUBLIC OF ARMENIA

Ashot VOSKANYAN

Ph.D., associate professor of the National Agrarian University of Armenia

Lusine TSPNETSYAN

Applicant for the Chair of Agribusiness Management and Policy
National Agrarian University of Armenia

Key words: agriculture, competitiveness, indicators, factors, budget allocations, index of agricultural production, productivity, gross product, commercialization of agriculture

Introduction. Proposing justified approaches to increase the competitiveness of Armenia's agriculture requires taking into account and assessing the influence of the factors that determine it, to highlight the factors that influence to a greater or lesser extent, which is possible as a result of the quantitative assessment of the said effect using regression models and econometric calculations. Although the role of such assessment is becoming more and more important in the economic literature, the evaluation of the quantitative relationship between not all result and factor indicators related to the branch, including the agriculture of our republic, has received the necessary attention. In this case, it refers to the statistical relationship between individual characteristics of competitiveness, which are the following result indicators: the value of the gross agricultural product, the agricultural product index, the productivity and commodity of agriculture, and the allocations from the RA state budget to the agricultural sector considered as a factor. If we take into account that there is a statistical relationship between these allocations and not all characteristics of agricultural competitiveness, which are the result indicators, then the identification of such a relationship becomes more important. In this context, the quantitative assessment of the impact of state policy on the competitiveness of RA agriculture is gaining relevance.

If we also take into account the special role of state policy in increasing the competitiveness of agriculture in terms of creating the necessary conditions, a favorable environment, and the need to identify the greater or lesser impact of that policy on the competitiveness of the sector compared to other factors, then our understanding of the relevance of the above assessment is more complete.

The purpose of the article is to evaluate the quantitative impact of allocations from the RA state budget to the agricultural sector, considered as the bearer of state policy, on individual characteristics of its competitiveness: the value of the gross agricultural product, the index of the volume of agricultural products, the productivity and commodity of agriculture.

Our tasks in this study are to specify the scope of agricultural competitiveness characteristics that have a statistical relationship between them and the indicator of allocations from the RA state budget to the agricultural sector, as well as to perform a regression analysis characterizing the impact of the mentioned allocations.

Methodology. The article uses dialectics, scientific abstraction, comparative analysis, logical and statistical methods. The application of the dialectic method is clearly seen when observing the movement of individual indicators in the tables included in the research over a number of years and determining the degree of closeness of the relationship between them using appropriate formulas. The application of the scientific abstraction method applies to the entire research, since the scope of the latter is limited to individual characteristics of agricultural competitiveness and one factor affecting them, that is, others were not considered. The application of the comparative analysis method found its expression in the comparative analysis of the impact of the budget allocations to agriculture on the individual characteristics of agricultural competitiveness: the value of the gross production of the agricultural economy, the volume index of agricultural products, agricultural productivity, and the level of commercialization, the results of which are reflected in the conclusions of the article. The use of statistical methods is demonstrated in the calculations of correlation and determination coefficients.

Literature review. A number of economists have paid particular attention to the factors related to the institute of competitiveness in agriculture [Borel, 2014, p.4], [Lenskaya, 2013, p.87], [Saubanov, 2010, pp.38-53], [Klyukach, 1998, p.208], [Bespyatnykh, 2000, p.200], [Koryakina, 2017, p.28]. Some authors have identified a more limited or comprehensive range of the mentioned factors. As a result, individual factors were somehow left out of view. We study, in particular, the state policy as such, which has not been considered by experts as a factor determining the competitiveness of agriculture.

It is also noteworthy that in the economic literature, the state policy factor was mostly considered in the context of contributing to the increase of the competitiveness of agriculture through the use of appropriate levers and the implementation of specific measures. As a result, the issues of quantitative assessment of the impact of this factor on the competitiveness of the mentioned branch have not yet been studied in the necessary depth, especially when it comes to the assessment of the impact of budget allocations considered as the bearer of state policy on individual characteristics of the competitiveness of RA agriculture with regression analysis. In other words, the study of the above-mentioned issues is mostly limited by the theoretical judgments related to the regression analysis, and in the context of the competitiveness of RA agriculture, not the necessary attention was paid to the identification of the statistical relationship between all the result and factor indicators.

Scientific novelty. In the studied period, the statistical relationship between the individual characteristics of the competitiveness of RA agriculture – the value of the gross production of agriculture, the volume index of agricultural products, the level of agricultural productivity and commercialization and the factor of budget allocations to agriculture are considered as the bearer of state policy, as well as the characteristics on which the mentioned factor had more or less influence.

Analysis. The results of the regression analysis are characterizing the influence of the state policy on the competitiveness of the agriculture of the Republic of Armenia. We used the following approach for the quantitative evaluation of the influence of state policy on a number of indicators determining the competitiveness of agriculture. As the bearer of state policy, we observed the allocations from the RA state budget to the agricultural sector and by calculating the correlation and determination coefficients, we tried to estimate their quantitative impact on the value of the gross agricultural product, the agricultural product volume index, agricultural productivity and agricultural commodity. Baseline data for calculations were taken for a long period of time, 15 years (budget data are available since 2007). The mentioned baseline data are presented in Table 1. Then, we first tried to assess the nature of the relationship between the state budget allocations to agriculture and the value of the gross agricultural output. In fact, we have the value of the gross output of agriculture as a result characteristic (designation y_t , billion drams), we consider allocations from the state budget for agriculture as a factor characteristic (designation x_t , million drams).

Table 1. Agricultural allocations from the RA state budget and indicators determined by it: value of gross agricultural output, agricultural productivity, index of volume of agricultural output, level of agricultural commoditization

Years	Budget expenses, mln drams	Gross agr. pro-duct value, bln drams	Index of agr. pro-duct volumes, %	Productivity thous. drams / people	Level of commercialization
2007	6700.183	633.9	109.6	1261.5	57.3
2008	10961.888	628.1	101.3	1285.2	54.6
2009	13671.217	552.1	99.5	1123.1	56.2
2010	7171.655	636.7	86.4	1294.9	55.8
2011	5808.389	795	113.9	1738.1	56.0
2012	9105.868	841.5	109.5	1924.7	56.1
2013	9337.618	919.1	107.1	2177.4	56.4
2014	9651.395	983	106.3	2516.5	56.2
2015	20208.724	945.4	108.4	2641.7	58.6
2016	27087.158	878.5	96.2	2598.3	57.3
2017	10516.520	908.6	97.6	2865.3	56.7
2018	9575.971	892.9	92.8	2675.0	56.5
2019	6235.071	853.3	95.9	2478.4	56.3
2020	9858.199	833.3	103.2	2465.4	57.2
2021	20053.744	934.4	99.1	2702.1	57.0

www.minfin.am/ yearbook, 2012, 291-292. 2017, 299-300. 2022, 252-253], RA NSS, Realization (use) of agricultural products by farmers, 2011, 3. 2016, 3. Sale of agricultural products by farms, 2020, 3. 2022, 3

"The deviation of one or other variables from the mean is the basis of the estimation of the correlation relationship. In the case of a linear relationship, its closeness is measured by the pairwise correlation coefficient, which is determined by the following formula:

$$r_{xy} = \frac{\sum_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}} \quad (1)$$

If the sign of the deviation from the mean coincides, then the relationship is direct ($r_{xy} > 0$), if the sign of the deviation does not coincide, then the relationship is inverse ($r_{xy} < 0$). The pairwise correlation coefficient ranges from -1 (random full inverse correlation) to 1 (full direct correlation). In absolute magnitude: $0 \leq |r_{xy}| \leq 1$: The closer the r_{xy} value is to unit, the closer is the relationship, the closer the r_{xy} value is to 0, the weaker is the relationship. When $r_{xy} < 0.30$ the connection is considered weak, $r_{xy} = 0.3 \div 0.7$ the connection is considered average, and when $r_{xy} > 0.7$ the connection is considered strong or close" [Yeliseeva, 78-81].

Based on the data in Table 1, we calculated the pairwise correlation coefficient between the budget allocations for agriculture and the value of gross agricultural output. The calculation results are presented in Table 2.

Table 2. Calculation table of the pairwise correlation coefficient between the amount of damage caused by the budgetary allocations of agriculture of the Republic of Armenia and the value of the gross agricultural product

Years	$x_i - \bar{x}$	$y_i - \bar{y}$	$(x_i - \bar{x})(y_i - \bar{y})$	$(x_i - \bar{x})^2$	$(y_i - \bar{y})^2$
2007	-5029.39033	-181.82000	914443.7504	25294767.12503	33058.51240
2008	-767.68533	-187.62000	144033.1222	589340.77102	35201.26440
2009	1941.64367	-263.62000	-511856.1034	3769980.12831	69495.50440
2010	-4557.91833	-179.02000	815958.54	20774619.53334	32048.16040
2011	-5921.18433	-20.72000	122686.9394	35060423.90931	429.31840
2012	-2623.70533	25.78000	-67639.12349	6883829.67616	664.60840
2013	-2391.95533	103.38000	-247280.3424	5721450.31666	10687.42440
2014	-2078.17833	167.28000	-347637.6716	4318825.18514	27982.59840
2015	8479.15067	129.68000	1099576.258	71895996.02803	16816.90240
2016	15357.58467	62.78000	964149.1654	235855406.79384	3941.32840
2017	-1213.05333	92.88000	-112668.3936	1471498.38951	8626.69440
2018	-2153.60233	77.18000	-166215.0281	4638003.01014	5956.75240
2019	-5494.50233	37.58000	-206483.3977	30189555.89101	1412.25640
2020	-1871.37433	17.58000	-32898.76078	3502041.89546	309.05640
2021	8324.17067	118.68000	987912.5747	69291817.28779	14084.94240
Σ			3356081.52960	519257555.94073	260715.32400

We insert the obtained data into the corresponding formula of the correlation coefficient and get:

$$r_{xy} = \frac{3356081.5296}{\sqrt{51927555.94073 \cdot 260715.324}} = \frac{3356081.5296}{11635222.47043} = 0.28844$$

The value of the correlation coefficient obtained as a result of the calculation shows that the relationship between the funds allocated to agriculture from the state budget and the value of the gross agricultural product for the republic is direct, close to the upper limit of weakness (it is located at the level of $0 \div 0.3$). The square of the correlation coefficient is the coefficient of determination [Yeliseeva, 2010, 81].

Coefficient of determination = r^2 (2)

The coefficient of determination is used to evaluate connections. It is usually expressed as a percentage. The value of that coefficient in this case is equal to $r^2=0.08320$ or 8.3%. This coefficient has a value of $0 \div 1$ and in this case it shows that the increase in the value of the gross agricultural product in the republic by 8.3% is due to the increase in the budget allocations for agriculture, that is, it contributes to the increase of the competitiveness of the sector. From the point of view of the quantitative assessment of the influence of the state policy on the competitiveness of the sector, we have also revealed the relationship between the budgetary allocations of the sector and the volume index of agricultural production. In this case, we also consider the index of agricultural production (designation y_i , %) and the allocations from the state budget for agriculture (designation x_i , million drams). For this particular example, we have calculated the correlation coefficient with a computer program. As a result $r_{(xy)}=0.13435$. In other words, it shows that the relationship between the budget allocations for agriculture and index of agricultural production, that is, economic growth, is inverse and weak. The coefficient of determination in this case is equal to $r^2=0.1805$ or 1.8%. This means that 1.8% of the changes in economic growth of agriculture is caused by changes in budget allocations, in fact it had almost no effect on economic growth. Using the same methodological approach, we tried to evaluate the relationship between the budgetary allocations of agriculture and agricultural productivity. In this case, we considered agricultural productivity as a result characteristic (designation y_i , thousand AMD / person), and as a factor characteristic we also consider allocations from the state budget for agriculture (designation x_i , million AMD). In this case, the correlation coefficient was calculated as $r_{xy}=0.38692$. In other words, it shows that the relationship between budget allocations for agriculture and agricultural productivity is direct, at an average level, it is in the range of 0.3-0.5. The coefficient of determination in this case is equal to $r^2=0.14971$ or 15%. This means that 15% of changes in agricultural productivity growth are due to changes in budget allocations. Using the same methodological approach, we tried to evaluate the relationship between the budgetary allocations of agriculture and the level of commercialization in agriculture. In this case, the level of commercialization of agriculture (y_i denotation, %), the factor characteristic remained the same. According to the calculation of the correlation coefficient: $r_{xy}=0.50820$. In other words, it shows that the relationship between the budget allocations of agriculture and the level of commercialization in agriculture is directly at the average level, it is almost in the middle of the

range of 0.3-0.7. The results of the calculations, the results of the calculation of the coefficients of correlation and determination between the budgetary allocations of agriculture and some indicators characterizing the competitiveness of agriculture are presented in Table 3.

Table 3: Results of calculation of correlation and determination coefficients between budget allocations of agriculture and other output characteristics

Factor attribute, x_i	Output feature, y_i	Correlation coefficient, r_{xy}	determination coefficient, r^2
Budget allocations to agriculture	Gross product value of agriculture, mln drams	0.28844	0.08320
	Index of agricultural production value, %	-0.13435	0.18050
	Agricultural productivity thousand drams/person	0.38692	0.14971
	Level of commercialization, %	0.50820	0.02583

Thus, the calculations made related to the impact of the policy in the field of agriculture, the quantitative impact of the budget allocations, show that it has a positive effect in general. It has a weak effect (upper limit) on the value of the gross agricultural product. The change in the value of the gross output of agriculture by 8.3% is caused by budget allocations. According to the results of the calculations, budget allocations have no noticeable effect on the economic growth of agriculture it is due to other factors. There is a direct relationship between the budget allocations of agriculture and agricultural productivity, this relationship is at an average level. About 15% of the change in agricultural productivity is caused by changes in budget allocations. As for the correlation between the mentioned factor characteristic and the level of commercialization of agriculture, it is average and the change in the level of commercialization is caused by changes in budget allocations by about 26%. In fact, the policy conducted in the field of agriculture has a positive effect on the competitiveness of agriculture with the demonstrated budgetary allocations, but this effect is weak.

Conclusions. As a result of the research, the following conclusions were made:

- the increase in the value of the gross agricultural product in the republic by 8.3% is due to the increase in the budget allocations for agriculture, that is, it contributes to the increase of the competitiveness of the sector;
- only 1.8% of the changes in the economic growth of agriculture is due to the changes in budget allocations, in fact it had almost no effect on the economic growth;
- 15% of changes in the economic growth of agricultural productivity are due to changes in budget allocations;
- 25.8% of the changes in the growth of agricultural products are due to changes in budget allocations;
- the policy conducted in agriculture has a positive effect on the competitiveness of agriculture with demonstrated budgetary allocations, but this effect is weak;
- considered as the bearer of state policy, the allocations from the RA state budget to the agricultural sector had the greatest impact on the agricultural commodity index,

and the least on the agricultural product volume index, among the characteristics of the competitiveness of that sector.

References:

1. Borel' A. Sushhnost' konkurentosposobnosti sel'skogo hozjajstva i formirujushhie ee faktory.(<http://evolutio.info>› 2014-4-borel)
2. Bepjatyh V. Upravlenie kachestvom i konkurentosposobn produkcii v APK. Kirov: 2000.200.
3. Korjakina O V. Kriterii, pokazateli i faktory konkurentosposobnosti produkcii agrarnoj sfery jekonomiki, Kaz UITs, g. Ural'sk, resp. Kazahstan (<http://elmag.uran.ru> › Numbers › Articles).
4. Lenskaja, T. I. Organizacionno-jekonomicheskie faktory povyshenija konkurentosposobnosti produkcii APK: dis. ... kand. jekon. nauk: 08.00.05 / T. I. Lenskaja. Minsk, 2013.
5. Saubanov, K. R. Konkurentosposobnost' regional'nogo sel'skogo hozjajstva v privolzhskom federal'nom okruge: dis. ... kand. jekon. nauk: 08.00.05 / K. R. Saubanov. Kazan', 2010.
6. Statistika: ucheb./I. I. Eliseeva i dr. Pod. Red. I.I. Eliseevoj.-M.: Prospekt, 2010.
7. HH AVC', Hayastani vitwakagrakan taregirq, 2012
8. HH AVC', Hayastani vitwakagrakan taregirq, 2017
9. HH VK, Hayastani vitwakagrakan taregirq, 2022
10. HH AVC' Gyowghatntesakan mt'erqi iracowmy' (o'gtagorc'owmy') gyowghaciakan tnesow-t'yowneri koghmic, 2011, 2016, 2020, 2022
14. <http://www.minfin.am/> (state budget)

Lusine TSPNETSYAN, Ashot VOSKANYAN

Quantitative assessment of the impact of state policy on the competitiveness of agriculture in the Republic of Armenia

Key words: agriculture, competitiveness, indicators, factors, budget allocations, index of agricultural production, productivity, gross product, commercialization of agriculture

It is impossible to get a comprehensive understanding of the impact of the factors determining the competitiveness of agriculture without a regression model and a quantitative assessment of that impact using econometric calculations, which allows to isolate the factors that have a greater or lesser impact. However, the range of result and factor indicators that have a statistical relationship with the competitiveness of the Republic's agriculture is not comprehensive (taking into account that not all of them may have such a relationship), which limits the possibilities of quantitative assessment of the joint impact of all factors on the said competitiveness. In this case, it is necessary to limit to the quantitative assessment of the impact of specific factors on individual characteristics of agricultural competitiveness. Taking into account the special role of the state policy factor in increasing the competitiveness of agriculture in terms of creating the necessary conditions and a favorable environment, the article highlighted and revealed the individual characteristics of the competitiveness of RA agriculture in the studied period: the value of the gross production of agriculture, the index of the volume of agricultural products, the productivity and commodity of agriculture. the statistical relationship between the level and the factor of budgetary allocations to agriculture considered as the bearer of the above-mentioned policy as a result of regression analysis. It made it possible to identify the characteristics of agricultural competitiveness on which the mentioned factor had more or less influence.