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AGRICULTURE
Research article

THE INFLUENCE OF MACROECONOMIC VARIABLES ON THE ROMANIAN AGRICULTURE

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Accepted April 2, 2015

Taking into consideration numerous studies and empirical research from the international literature, the impact of macroeconomics and financial sector on the agricultural sector has been demonstrated by the existence of a causality relation between agriculture and some macroeconomic variables. In these circumstances, we developed the present study which analyzes, applying statistical tools and data from 20 years, the relationship between agriculture in GDP and the main macroeconomic variables, in the case of Romania: the consumption price index, the consumption price index for food, the exchange rate (RON/EUR), the interest rate for credits, and the interest rate for deposits. The analysis reveals that: the only variables which influence the agriculture in GDP are the exchange rate related to euro, with an indirect influence, the interest rate for credits and the interest rate for deposits, both with direct influence.The consumption price index and the consumption price index for food do not influence the agricultural GDP on a short period of time. We can conclude that, in Romania, the macroeconomic simulations, especially for the agricultural sector are based on questionable estimations. They are made of series of mostly annual data, covering short periods when there were structural changes, and not very homogeneous statistics.

Key words: Agricultural results; macroeconomics; statistical correlations.

INTRODUCTION

The relationship between agriculture and macroconomic variables has been an extensive subject of empirical research, being demonstrated that macroeconomics and financial factors are very important for agricultural field.

For instance, ever since 1976, Dornbusch's developed a model of exchange rate determination, which established connections among exchange rates, money, interest rate and commodity prices[7].

Later, in 1984, Bessler, analysing the connection between agricultural prices, industrial prices, and money supply, demonstrated that, for Brazilian agriculture, there is a one-way strong causality relation from money supply to agricultural prices, and a feedback correlation between industrial prices and money supply. He stated that, "under the usual monetarist ordering of contemporaneous innovation covariance, agricultural prices do not adjust faster than industrial prices to a shock in the money supply"[3].

In 1998, Zanias studied the relationship between agricultural prices and the general price level in Greece and he found out that "agricultural prices overshoot in the short-run, while the adjustment speed to the long-run inflation neutrality is slow". He explained the existence of overshooting by the evolution of agricultural prices in Greece, during the past two decades before his study, "while the lower inflation rates envisaged by the economic convergence programme to meet the Maastricht criteria, caused a 15 percent decline in

real agricultural prices during the period 1994 to 1998"[10].

Cho *et al.* (2004) tested the long-run neutrality of the domestic money supply and exchange rates on the relative agricultural prices in the United States, for the period of 1974–1996. They found out that "a 1 percent real appreciation of U.S dollar was associated with a 0.131 percent decrease (increase) of food prices compared to the aggregate price level in the long-run"[4].

Bakucs and Ferto (2005) analysed the relation between the exchange rate and prices in response to unanticipated monetary shocks, in order to investigate whether agricultural prices overshoot in a transition economy. Their results indicated that "agricultural prices adjust faster than industrial prices to innovations in the money supply, affecting relative prices in the short run, but strict long-run money neutrality does not hold"[2].

Gil *et al*. (2009) analysed the impact of changes in the monetary policy and the exchange rate on agricultural supply, prices and exports. They used ten variables: interest and exchange rates, money supply, inflation, agricultural output and input prices, agricultural supply and exports, income and commercial openness rate. Their results indicated that "changes in macroeconomic variables have an effect on the agricultural sector but the reverse effect does not hold"[8].

Agapie (2012) analysed the real-time monitoring of the macroeconomic activity in Romania, with an instant analysis of the implications in the agricultural sector. The main finding of the researcher is that the influence of macroeconomic variables to the net income in agriculture is mainly due to the demand in this sector. The author concluded that, the indirect effects of the macroeconomic environment on the agricultural sector are mainly due to the impact of exchange rates and energy prices. The depreciation of national currency determines the agricultural products of the country to be more attractive and competitive on the domestic market, by reducing the imports and, in this way, they contribute to the revenue growth in the agricultural sector[1]. On the other hand, a decrease in GDP leads to a decrease in energy prices. The decrease of energy prices tends to reduce the production costs, having a negative effect on the demand for agricultural products and a positive effect on agricultural supply.

We can conclude that, the main findings of the international literature underline the fact that there is a causality relation between the agriculture and the macroeconomics, strong enough and often sensitive to variable choices.

In this study, we will further analyze, for Romania, the existence of statiscal correlations between the agriculture and macroeconomics, based on data for a period of 20 years.

MATERIALS AND METHODS

In Romania, the agriculture represents one of the major branches of the economy, its contribution to GDP formation (together with forestry and fisheries) ranges around 4.4% of GDP at the end of the year 2014. However, compared to the year 1995, when agriculture represented over 18% of GDP, its share went down nearly four times (Figure 1). This decrease of agriculture represents a normal evolution for a developing economy, in which the share of industry increases (representing around 30% of GDP at the end of the year 2014), together with the share of services, to the detriment of agriculture[13].

The evolution of agriculture in GDP in the last 20 years becomes a relevant indicator for the economy of Romania, during this period. Thus, from 18.1% of GDP in the year 1995, the agriculture gradually declined over the next ten years. In 2005, it descended for the first time below 10%, reaching 8.42%. This decreasing trend coincides with a period of accelerated growth that the economy had before entering in the European Union, with emphasis on industry, services and construction. After entering in the EU, the agriculture in GDP had peaks of over 6% in 2008, 2009 and 2011, and minimum values of 5%, in 2012 and 2014.

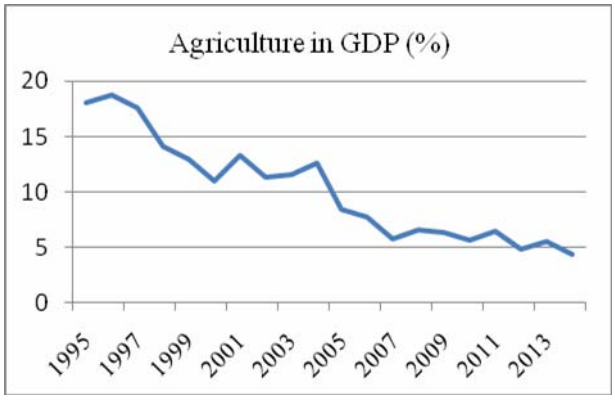

Fig. 1. The evolution of agriculture in GDP in Romania, for the period 1994–2014.
Source: National Institute of Statistics, Romania, own processing data.

The ratio between arable area of Romania and population shows that, every inhabitant of Romania holds about 0.41 hectares of arable land, ranking the 6th position in the EU27, which represents an important value for many European Union countries, and nearly double compared to the EU27 average, which is 0.212 ha/capita. According to the Eurostat data, the first places in the EU27, in terms of arable area per capita are taken by: Lithuania (with 0.533 ha/capita), Latvia (0.482 ha/capita), Estonia (0.481 ha/capita), Denmark (0.454 ha/capita) and Finland (0.425 ha/capita)[11].

According to the usage, the arable land occupies 61.26% of the agricultural area, the rest being pasture (over 20%), meadows, vineyards and grapevine nurseries, orchards and fruit trees. From the total cultivated area, over 80% is owned by grains and industrial plants.

Regarding the agricultural production, the highest share is taken by the crop production (over 60%), and the difference, by the animal production. The largest share in crop production is hold by cereals (over 30%), vegetables and melons (over 20%), and hay and forage plants (13%). The highest production per capita is registered by cereals, with more than 600 kg/capita (mainly, maize and wheat), and vegetables, with 176 kg/capita, at the level of the year 2013.

Romania is considered to be a vineyards country, ranking the 5th place in the EU in terms of vineyard area (over 210 thousand hectares, representing 1.4% of the total agricultural area) and the 6th place for the production of grapes (950,000 tons) and wine (5,113,300 hl)[11].

In Romania, a large number of small farms (farms of 1–5 ha represent 80% of the total) is recorded, compared to large farms (farms over 100 ha represent only 1.3% of the total), which reveals structural imbalances of Romanian agriculture and its competitiveness.

The consumption of the population depends not only on the existence of food production, but also on the creditworthy demand. Thus, regarding the vegetable products, the annual highest average consumption per capita was recorded for cereals and cereal products (208 kg/capita), followed by vegetables and vegetable products (177 kg/capita) and potatoes (104 kg/capita). For animal products, the largest consumption was recorded for milk (234 l/capita), eggs (245 pcs/capita) and meat and meat products (about 60 kg/capita).

From the total number of agricultural production of 64,259 million lei current prices (14,541 million euro), 5,293 million euro are exported (36.4%), and 4,962 million euro are imported, the trade balance being positive (2013 being the first year with positive balance). The largest share in the exports is held by crop products (2,990 million euro) and food, beverages and tobacco (1,316 million euro). For imports, the largest share is held by food, beverages and tobacco (2,179 million euro) and vegetable products (1,457 million euro).

Regarding the ***evolution of the economy***, since 1990, the Romanian economy had an oscillating evolution over the last twenty five years. On the first decade, there were two economic cycles, beginning with a recession period between 1990 and 1992, followed by an economy re-launching between 1993 and 1996, and a new recession period registered between 1997 and 1999.

Beginning with the year 2000, a new economic growth period started reaching its end together with the installation of the financial crisis at the beginning of the year 2008. The growth was determined, significantly, by rising the activities from services, construction and industry fields. The efective final consumption and, especially, individual final consumption of households had registered a high growth determined by the increase of goods sales through retail trade and the population services activity. Also, the gross fixed capital formation and, especially, the investment level had registered substantial growths.

The economic growth after the year 2004, considered to be the highest for Romania after 1989, was realised principally due to a good agricultural year and to constructions, with an increase of 22% for agriculture and 9% for constructions. Generally, during the period 2000–2008, in Romania, the most important contribution to the creation and dynamics of GDP was held by the final consumption (the increase with one percent of the final consumption determines a GDP growth with 0.714%)[6].

After the year 2009, together with significant contraction of economic growth and rise of unemployment, the national currency ("leul") entered under the pressure, the credit debts rose unexpectedly and the credit level reduced considerably, on the background of risk aversion and limited financing banks resources.

The main contributors to GDP growth in 2014 compared to 2013 had the following branches:

industry (+0.9%), with a share of 24.0% of GDP and whose activity volume increased by 3.5%; information and communications (+0.6%), with a percentage of 6.0% of GDP and whose business volume increased by 11.0%[13].

The GDP/capita represents the most synthetic criterion for real convergence criteria for EMU accession. Assessed through the gaps of GDP per capita, expressed in Standard Purchasing Power (SPP), Romania registered a significant progress during the last two years, the GDP per capita reaching 54% of the EU28 average in 2014, respectively 52.9% in 2012 and 51.2% in 2011[14] (Table 1).

Table 1

Perspectives of GDP per capita in Romania expressed in Standard Purchasing Power (SPP)

Indicator	2012	2018	2020
GDP per capita in Romania (SPP), % of average of EU- 28	52.9	64.2	69.5

Source: The Eurostat and The Romanian Government, The Convergence Program for the period 2014–2017, April 2014, p. 5

The evolution of ***inflation rate*** in Romania (Figure 2), also, had an oscillating trend after 1990. In 1997, the inflation rate reached the highest level of 154.8% and, after this year, it started to decrease. At the end of the year 2014, the annual inflation registered the historical minimum level of 1.07% since 1990, with 1.5 percentage points lower than the end of the year 2013, the lowest value in the last 24 years[12].

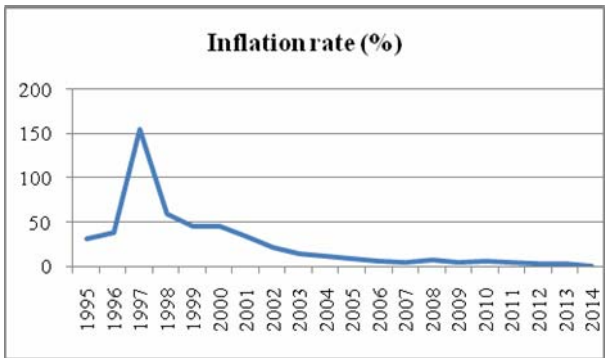

Fig. 2. The evolution of inflation rate in Romania, period 1994–2014.
Source: National Bank of Romania, periodical publications.

The ***banking sector*** has also an important influence for all branches of the economy. Dominated by foreign banks, banking activity grew quickly. From 2003 until the crisis, private sector credit grew at an average annual rate of 50 percent. The number of debts registered to the payment of credits constantly increased (21.9%, at the end of 2013, from the total non-governmental credits). The interest rate for credit registered oscillating values for the period 1995–2000, having the highest level of 65.9%, in 1999. After this year, it started to decrease to 53.21% in 2000 and to 13.32% in 2007, the moment of accession to EU, and for the year 2014, its average was of 8.45%. The interest rate for deposits had almost a similar evolution, the highest level was 51.6% in 1997 (the interest rate for credit was 63.7%) and, after the year 2000, it started to have a decreasing evolution, from 32.44% in 2000 to 3.02% in 2014. We can say that, banks in Romania have charged high levels of interest rate margin compared to other countries, due to the lower level of financial intermediation recorded in Romania (the share of non-governmental credit in GDP was 10.1% in the early 2001, gradually increasing to 35% in 2014)[5]. "The interest rate margin is among the most important factors that gauge the efficiency of financial institutions and wide interest margins are seen to have negative implications for financial intermediation and financial development"[9].

In our study, we also analyze the influence of the exchange rate related to euro and the interest rates (for loan and deposits) on the agricultural GDP. A scenario made by the Romanian Ministry of Public Finance regarding the factors which influence the interest payments shows that: the depreciation of the national currency against the euro by 10% would have a low negative impact on the interest payments, which will increase up to 0.06% of GDP in 2017. On the other hand, the interest rates rising with 1% would result in a higher increase of interest payments share with up to 0.15% in 2017[6]. These results are important for our research, taking into account that, these variables influence each other, with impact on GDP evolution.

On this background of the agricultural environment and the economy evolution, we analyze the correlation between the agriculture and macroeconomics, based on the annual data offered by the National Institute of Statistics from Romania and National Bank of Romania, for the period 1995–2014. The method applied for the analysis is the multiple linear regression model for the same variables used in the international literature by many researchers, in order to test if

these variables influence the agricultural field of Romania.

Thus, we tested 20 observations (for the period 1995–2014, annual values) for the following variables:

– the agriculture share in GDP, as dependent variable;
– the consumption price index, the consumption price index for food products, the exchange rate (RON/EUR), the interest rate for credits and the interest rate for deposits, as independent variables.

For these data, we applied the multiple linear regression method. This method involves the statistical analysis of the correlation between the variables, which reveals a possible causality relationship between two categories of variables (dependent and independent) and the direction of this causality.

RESULTS AND DISCUSSION

Applying linear regression function between variables considered above, we could observe that: all independent variables were entered into the model (Table 2 from Annex); the Pearson correlation coefficient (R) has a high value (0.935), which means a strong and positive correlation between the independent variables and the agricultural GDP (Table 1 from Annex); the level of R square, of 0,875, reveals that, in proportion of 87.5%, the agricultural GDP is influenced by all the five variables (Table 1 from Annex). The second step consists in verifying the F test from ANOVA model (Table 3 from Annex), whose role is to demonstrate the existence of a single variable for which the regression is not zero. It rejected the invalidity of the regression (the value for the variable F is not 0). Still, even with these results, the multiple linear correlation reveals that (Table 4 from Annex): *the significance of the independent variables* (column Sig. of table) is up to the acceptance level of 0.05; the *tolerance* value is greater than the value of 1-Adjusted R Square (1–0.83 = 0.17); and the value of VIF is up to 10, for all variables. These final results invalidate the statistical analysis, by manifesting the multicollinearity risk between the independent variables. More, the residuals, compared with the normal distribution law (Figure 1 from Annex), reveal the same result: the linear regression model can not be applied for the data analyzed.

These results are explained by the Romanian economy evolution on the period analysed: the oscillating evolution after 1990, with a recession period between 1990 and 1992, followed by an economy re-launching between 1993 and 1996, and a new recession period between 1997 and 1999. After the year 2000, a new economic growth period started, reaching the installation of the financial crisis at the beginning of the year 2008.

On this instable economic background, the variables analyzed in the international literature, for stable economies, or with uniform trends, are not verified for the macroeconomic environment in relation with agricultural component.

Further, we analyze ***the simple linear regression for dependent variable, the agriculture share in GDP, in relation with each independent variable***. From the Table 5 from Annex, we can see that: the consumption price index, and the consumption price index for food products are not influencing the agriculture in GDP, since the Pearson correlation coefficients are not high, being 0.692 for the consumption price index, and 0.683 for the consumption price index for food products.

The only variables which influence the agriculture share in GDP are the exchange rate related to euro (indirect one, the Pearson coefficient being negative,–0.894), the interest rate for credits and the interest rate for deposits (direct influence, positive Pearson coefficients, 0.881, respectively, 0.870).

Next, we determined the level of influences of the three variables to the agriculture share in GDP.

The ***relationship between the agriculture share in GDP and the exchange rate (RON/EUR)*** has been demonstrated in many international researches. In our study, we can see in Table 6 from Annex, the model of correlation between the considered variables for Romania, for the period 1995–2014. Thus, analyzing the correlation between variables, 80% from the variation of agriculture share in GDP is influenced by the variation of the exchange rate (R square coefficient, from Table 6 from Annex). The ANOVA test (Table 7 from Annex) reveals that the F value is not 0, which invalidates the rejection of the regression model.

The final step of regression coefficients (Table 8 from Annex) shows that the significance of the independent variable is 0, which demonstrates the validation of analysis.

Using the calculated coefficients, which are found in column B of Table 8 from Annex, the

simple linear regression model is given in equation no. 1.

$$Y = -2.482 \times X_1 + 18.67, \quad (1)$$

where:

Y – the agriculture share in GDP;
X_1 – the exchange rate RON/EUR.

That means, on a short time horizon, when the exhange rate for euro increases by 1 point, the agriculture share in GDP decreases with 2.482%.

The influence of euro into the agriculture share in GDP is of high importance, since, from the total of agricultural products, 65% represent exports in EU[11].

The next correlation analysis between ***the agriculture share in GDP and the interest rate for credits,*** for the period 1994–2014**,** shows the following results: based on strong correlation between variables, through the high value of Pearson correlation coefficient (R = 0.881), 77.6% of the variation of agriculture share in GDP is explained by the interest rate for credits (Table 9 from Annex); the significance coefficient from regression model is 0 (Table 10 from Annex). Using the unstandardized coefficients from Table 10 from Annex, we have the regression equation 2.

$$Y = 0.202 \times X_1 + 3.926, \quad (2)$$

where:

Y – the agriculture share in GDP;
X_1 – the interest rate for credits.

The variation of interest rate for credits with 1% determines, on a short horizon of time, an increase with 0.202% of agriculture share in GDP.

The impact of interest rate for credits to the agriculture share in GDP is not very high, considering the share of credits for agricultural sector into the total credits, for 2014, meaning 3.83% (the value of credit for agricultural sector is 12089 mil. lei, from the total of credit of 315461 mil. lei)[12]. Still, the dependence of agriculture on industry and services sectors is indirectly influencing the results in agriculture (the share of credits for industry and services into the total of banking credits represent 45%).

The third correlation analysis between ***the agriculture share in GDP and the interest rate for deposits*** shows similar results with the interest rate for credits variable: 75.7% from variation of agriculture share in GDP is explained by the interest rate for debits (Table 11 from Annex); the significance coefficient from the regression model is 0 (Table 12 from Annex). The unstandardized coefficients (Table 12 from Annex) lead to the regression equation 3.

$$Y = 0.254 \times X_1 + 5.453, \quad (3)$$

where:

Y – the agriculture share in GDP;
X_1 – the interest rate for deposits.

The variation of interest rate for deposits with 1% determines, on a short horizon of time, an increase with 0.254% of agriculture share in GDP.

CONCLUSIONS

The studies at the international level on the macroeconomic impact on the agricultural sector took into account variables such as exchange rates, interest rates and income per capita. The studies can be classified in studies of the impact of macroeconomic variables on the prices of consumer goods in the agricultural sector, and studies which attempted to quantify the adjustment processes in the agricultural sector under the influence of general changes in the macroeconomic environment. In a stable economy, the macroeconomic variables influence the agricultural sector.

For the Romanian environment, the application of the multiple linear regression method for he agriculture share in GDP, as dependent variable, and the macroeconomic variables, the consumption price index, the consumption price index for food products, the exchange rate (RON/EUR), the interest rate for credits, and the interest rate for deposits, as independent variables, reveals that there is not a causal relationship between the agricultural component and the selected macroeconomic variables. These results are explained by the high influence between the independent variables and of the risk of their collinearity.

The analysis for each ***independent variable*** in relation with agriculture share in GDP reveals that: the only variables which influence the agriculture share in GDP are the exchange rate related to euro, with an indirect influence, the interest rate for credits and the interest rate for deposits, both with direct influence.

The consumption price index and the consumption price index for food products do not influence the agricultural GDP on a short period of time.

We can conclude that, in Romania, the macroeconomic simulations, especially for the

agricultural sector are based on questionable estimations, being made on account of a series of mostly annual data, and covering short periods when there were structural changes, and not very homogeneous statistics.

More, the Romanian economy presented an oscillating evolution after the year 1990, with favourable economic growth for the period 1993–1996 and 2000–2008. The year 2008 is the year of the beginning of the economic and financial crisis. Periods between 1990–1992, 1997–1999 are recession periods.

On the other hand, the evolution of agriculture share in GDP, in Romania, represents a normal trend for a developing economy, in which the share of industry and services increases, to the detriment of agriculture.

The high share of agriculture in the economy produces vulnerabilities for the economic growth, given that, the results of most agricultural segments are dependent on the unpredictable natural conditions. The average share of agriculture in the EU Member States stands for about 1.7%.

Still, the share of arable area per capita in Romania, which ranks Romania on the 6th place into the EU27[11], reveals the importance of this natural resource for our country and the necessity for its sustainment by the state.

In the line with the Common Agricultural Policy for 2014, several ***forms of the support for farmers*** were applied in Romania[11].

Thus, ***for crops***, there were applied the following forms of support: 1. European grants, called the *Single Area Payment Scheme (SAPS)*, with the source of financing from the European Agricultural Guarantee Fund (EAGF). SAPS consists in allocating a fixed amount per hectare, payable annually, irrespective of production (unconditional of the production obtained). The maximum amount of subsidies for the SAPS was 156.89 euros/ha in 2014, compared to 139.17 euro/ha in 2013; 2. *National Transitional Aid (NTA),* granted from the state budget, for the arable crops, former PNDC – National Direct Compensatory Payments, of 19.81 euro/ha. The NTA started in 2015 until 2020, from 100% to 50% of the amount of support that was granted in 2013; *3. State aid for the purchase of diesel fuel* with low excise duty, 10.10.2013–30.09.2014. State aid is granted in the form of excise duty refund for the difference between standard and reduced rate (set at 21 euros/1000 liters) for the diesel used to perform mechanized works in agriculture; 4. State aid for insurance of the agricultural production at an insurance company, for which 50% or 70% of the insurance premium, is supported by the state, depending on the risks insured. To support farmers, the state adopted, beginning with the year 2002, the Law 381 regarding the grant of compensation in case of natural disasters in agriculture. For the damage caused by natural phenomena, farmers bear 30% of production costs, justified with documents, and the state supports the difference, which in the case of a total loss may not exceed 70% of it. For animals, birds, bees and fish families, the insurance compensation represents up to 80% of the insurance value, from which the amount of by-products, that can be sold according to the law, is deducted; 5. Specific support for improving the quality of agricultural products in the organic farming sector, granted for plant and animal farms, for the period of conversion to the organic agriculture. Since 2015, the EU pays special attention to ecological farming practices, which have greater relevance for farms in mountain areas. 6. Financial support granted to producer groups and producer organizations in the fruit and vegetables field, for constitution and investment, the support being correlated with the value of commercialized production; 7. Assistance through the National Program Support for the wine sector.

In ***zootechnics***, the following forms of support by the state exist in Romania: 1. The National Transitional Aid (ANT), former PNDC, for cattle, sheep and goats. In 2014, the subsidy for cattle started from 102 euros per animal and from 8.66 euros per head for sheep and goats; 2. National Beekeeping Program Funding; 3. Community support for producers of milk and beef, sheep and goats meat in disadvantaged areas; 4. State aid for improving animal breeds; 5. State aid for the collection of dead animals (rendering); 6. Minimis aid for the conservation of endangered animals in Romania; 7. Minimis aid for the purchase of milk cooling tanks.

These forms of support for farmers are necessary to sustain the agricultural products in our economy.

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ANNEX

Table 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.935[a]	0.875	0.830	1.90893

[a] Predictors: (Constant), Interest rate for deposits (percentage), Consumption price index for food products, Exchange course rate (ron/euro), Interest rate for credits (percentage), Consumption price index

Table 2

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Interest rate for deposits (percentage), Consumption price index for food products, Exchange course rate (ron/euro), Interest rate for credits (percentage), Consumption price index[b]	.	Enter

[a] Dependent Variable: Agriculture GDP (percentage)
[b] All requested variables entered.

Table 3

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	355.583	5	71.117	19.516	.000[b]
	Residual	51.016	14	3.644		
	Total	406.599	19			

[a] Dependent Variable: Agriculture GDP (percentage)
[b] Predictors: (Constant), Interest rate for deposits (percentage), Consumption price index for food products, Exchange course rate (ron/euro), Interest rate for credits (percentage), Consumption price index

Table 4

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	11.009	4.226		2.605	.021		
	Consumption price index	–.220	.157	–1.669	–1.401	.183	.006	158.385
	Consumption price index for food products	.229	.141	1.689	1.631	.125	.008	119.642
	Exchange course rate (ron/euro)	–1.781	1.107	–.560	–1.609	.130	.074	13.531
	Interest rate for credits (percentage)	.241	.122	1.051	1.986	.067	.032	31.213
	Interest rate for deposits (percentage)	–.185	.251	–.633	–.735	.475	.012	82.763

[a] Dependent Variable: Agriculture GDP (percentage)

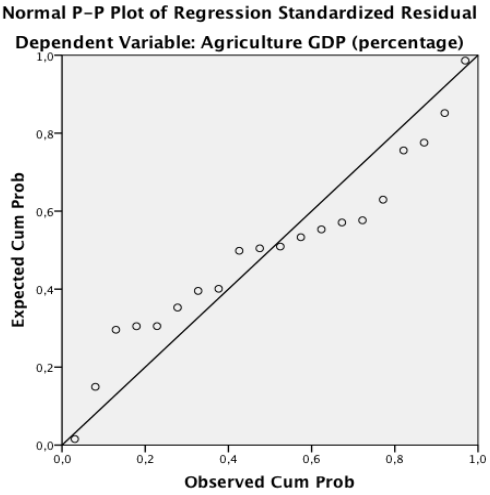

Fig. 1. P-P Regression Standard Residual graph.

Table 5

Correlations between agriculture GDP, the consumption price index, the consumption price index for food products, the exchange rate (RON/EUR), the interest rate for credits, and the interest rate for deposits, as independent variables

		Agriculture GDP (percentage)	**Consumption price index**	**Consumption price index for food products**	**Exchange course rate (ron/euro)**	**Interest rate for credits (percentage)**	**Interest rate for deposits (percentage)**
Agriculture GDP (percentage)	Pearson Correlation	1	0.692**	0.683**	–0.894**	,881**	.870**
	Sig. (2-tailed)		0.001	.001	.000	.000	.000
	N	20	20	20	20	20	20
Consumption price index	Pearson Correlation	0.692	1	.993**	–.713**	.777**	.839**
	Sig. (2-tailed)	.001		.000	.000	.000	.000
	N	20	20	20	20	20	20
Consumption price index for food products	Pearson Correlation	0.683	.993**	1	–.689**	.734**	.801**
	Sig. (2-tailed)	.001	.000		.001	.000	.000
	N	20	20	20	20	20	20
Exchange course rate (ron/euro)	Pearson Correlation	–0.894	–.713**	–.689**	1	–.905**	–.934**
	Sig. (2-tailed)	.000	.000	.001		.000	.000
	N	20	20	20	20	20	20
Interest rate for credits (percentage)	Pearson Correlation	0.881	.777**	.734**	–.905**	1	.979**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	20	20	20	20	20	20
Interest rate for deposits (percentage)	Pearson Correlation	0.870	.839**	.801**	–.934**	.979**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	20	20	20	20	20	20

Table 6

Model Summary for the agriculture in GDP and the exchange rate (RON/EUR)

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	–0.894[a]	0.800	0.789	2.12609

Predictors: (Constant), Exchange rate (RON/EUR)

Table 7

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	325.234	1	325.234	71.950	.000[b]
	Residual	81.365	18	4.520		
	Total	406.599	19			

[a] Dependent Variable: Agriculture GDP (%)
[b] Predictors: Exchange rate (ron/euro)

Table 8

The regression coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	18.67	1.107		16.86	0.0
	Exchange rate, ron/euro	–2.84	0.335	–0.894	–8.48	0.0

[a] Dependent Variable: Agriculture GDP (percentage)

Table 9

Model Summary for agriculture in GDP and interest rate for credit, period 1994–2014

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.881[a]	.776	.764	2.24896

Predictors: (Constant), Interest rate for credits (percentage)

Table 10

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.926	0.939		4.182	0.001
	Interest rate for credits (percentage)	0.202	0.026	0.881	7.899	0.000

Dependent Variable: Agriculture GDP (percentage)

Table 11

Model Summary for agriculture in GDP and interest rate for deposits, period 1994–2014

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.870[a]	0.757	0.744	2.34092

Predictors: (Constant), Interest rate for deposits (percentage)

Table 12

Regression Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.453	0.820		6.647	0.000
	Interest rate for deposits (percentage)	0.254	0.034	0.870	7.497	0.000

Dependent Variable: Agriculture GDP (percentage)