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EFFECTS OF THE ECONOMIC CRISIS ON RURAL HOUSEHOLD INCOMES IN ROMANIA

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Abstract

The rural area in Romania has experienced a transformation process in the last decade mainly due to overall economic growth and to the effects of EU integration. The agricultural activity is still dominant, even if the share of employment in this sector followed a strong decreasing trend. The economic crisis starting in 2008 produced structural changes in the use of labor force, with impact on the population's income. The paper presents an empirical analysis of the economy´s evolution from macroeconomic perspective and focuses on the effects of the crisis on the rural area. The research uses the multiple linear regression to analyze the impact of economic growth and employment on investment in agriculture and on total income of rural households. The results show that investment in agriculture is connected to the variation of GDP and has a negative correlation with employment in agriculture. The household income has a high sensitivity to GDP changes, which have effects on salaries and social provisions in rural areas. However the subsistence component of the rural activities determines an important inertia of the total household income, which is very little influenced by investments in agriculture and is less reactive to the economic crisis compared to urban areas.

Key words: *economic crisis, investment, employment in agriculture, income of rural households*

INTRODUCTION

The European Union is concerned to identify the trends and drivers that will determine the future of the agricultural sector and rural areas ahead to 2020 [2]. Besides the objective of increasing the economic efficiency of farms, the new vision of agriculture as a multifunctional activity reshapes the role of rural areas and provides new ways to reduce the rural-urban income gap. In 2009 the GDP per inhabitant in the EU predominantly rural regions was 73% of the European GDP average [4]. However the growth of GDP per inhabitant in the period 2000-2008 in the rural areas was more pronounced than in urban areas, showing a catching-up process.

According to the new Eurostat methodology, the predominantly rural area in Romania covers 46.2% of the population, which is similar to other EU countries such as Slovakia (50.3%), Estonia (48.5%), Hungary (47.9%), Greece (44.2%) and Slovenia (44.1%), and lower than Ireland (70.5%) [3]. In Romania the GDP per inhabitant in 2009 was however only 70.1% of the national average, lower than in the above mentioned countries, except Estonia.

In Romania the low household income level in rural areas is closely connected to the low labor productivity in the main economic activities, while a significant share consists of the subsistence economy. In the last decade the major change was the gradually decrease of the employment rates in agriculture. A large part of the rural economy is disconnected from the market economy and agriculture still plays the traditional role of occupational buffer. In addition, the urban-rural migration of elderly people [5] marks the household typology and the income sources. All this rises the question about how strong is the influence of macroeconomic changes on the rural regions, both during sustained growth and crisis periods.

The paper focuses on the impact of the national economy´s evolution on the rural area during the period 2002-2010. The analysis considered two critical variables for the catching-up process of the rural areas in Romania: investment and household income. The research topic refers to the estimation of the influence of macroeconomic variables such as changes in GDP, investment and employment rate on the investment in agriculture and on the average income of rural households.

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MATERIAL AND METHODS

The research method used is the multiple linear regression. The paper includes two applications of the regression model. The first model studies the relationship between changes of investment in agriculture as dependent variable and the dynamics of GDP, total national investment and total employment. The second model focuses on the changes of the average income of rural households as dependent variable again under the influence of the dynamics of GDP, total national investment and total employment.

The research of the crisis period makes sense if it is compared to the previous period. The relevant period chosen for the analysis is 2002-2010, which includes seven years of sustained economic growth (2002-2008) and two years of economic crisis (2009-2010). An important limitation of the time series is the availability of data. Beginning with 2002, the data about employment are not comparable with data series of previous years, because of revised definitions used.

The applications use the dynamic series of the indicators. The empirical analysis of the changes of GDP, investment and employment is based on data provided by the Romanian Statistical Yearbook, while the analysis of rural household income relies on data from the Household Budget Survey. The calculations of the regression involved the use of the package Eviews 4.1. We used a linear multifactorial model tested by means of the Durbin-Watson test [1] in order to verify the autocorrelation of residuals.

RESULTS AND DISCUSSIONS

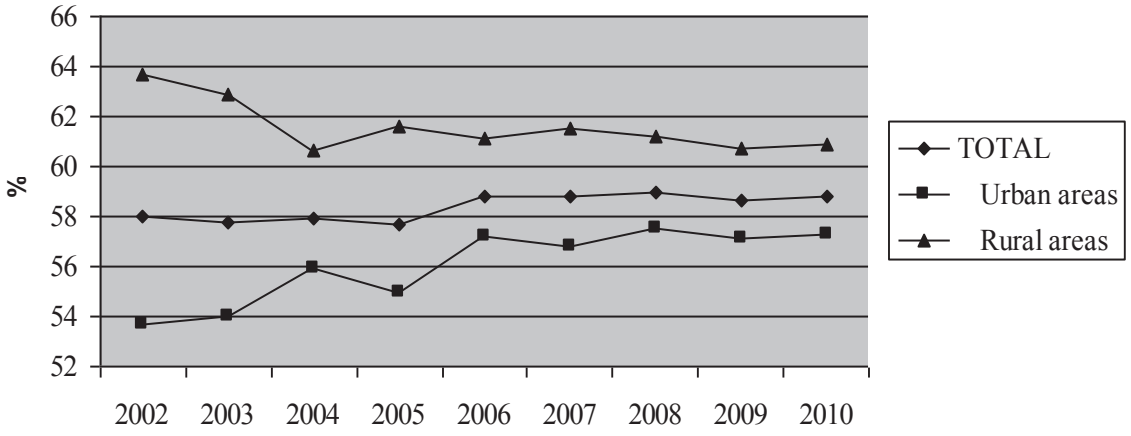
Growth, employment and investment

The sustained economic growth in Romania during the period 2000-2008 produced changes in the level and structure of the economic activity in Romania. The changes occurred in employment and productivity and were accompanied by the improvement of the average real household income. Consumption was actually the engine of growth, but investment had also an upwards movement during this period. The crisis in 2009 and 2010 has abruptly inversed the trend, with major economic and social consequences. The shock of the economic crisis has influenced differently the urban and rural areas. In Romania the nominal change 2009/2008 of the GDP was only -4.9% in the predominantly rural areas compared to -6.0% at national level [4].

The employment rate in Romania has only slightly increased, from 58% in 2002 to 59% in 2008, as a cumulative result of structural changes in labour force. The employment rate had a positive trend in urban areas and a decline in rural areas (fig.1). Rural employment was strongly marked by the diminishing over-employment in the subsistence agriculture, while agriculture still is the main economic activity. However, in the context of the economic crisis that became visible in Romania in 2009, the trend of diminishing employment in agriculture was interrupted. In 2010 the 1.2 percentage point increase of employment in agriculture proves that this activity still plays the role of occupational buffer.

It is expected that, besides the reduction of employment in agriculture, the source of productivity in rural areas should be the investment in main rural activities. Since agriculture still dominates the rural economy, this paper focuses on investment in agriculture. The share of investment in agriculture in total national investment is significantly below the contribution of this branch to the GDP [10]. Moreover, the share of net investment in agriculture did not exceed 4% from the national net investment during 2002-2010, except 2002 (11.7%) and 2003 (5.9%) when it benefited from the pre-accession support, especially provided by the Special Accession Programme for Agriculture and Rural Development (SAPARD) [9]. The shock of the crisis reduced severely the investment in Romania, with a similar impact in agriculture.

Fig.1: Employment rate in Romania, by areas of residence, 2002-2010



* employment rate calculated for the working age population (15-64 years)
Source: Romanian Statistical Yearbook Time series 1990-2009 and 2010, National Institute of Statistics

Trends in rural household income

The rapid economic growth had a similar impact on the urban and rural population, by keeping the household income gap relatively unchanged. However, a reduction of this gap was visible during the crisis, since the rate between the total rural household income and the total national household income increased from 82.2% in 2008 to 82.9% in 2009 and 84.2% in 2010.

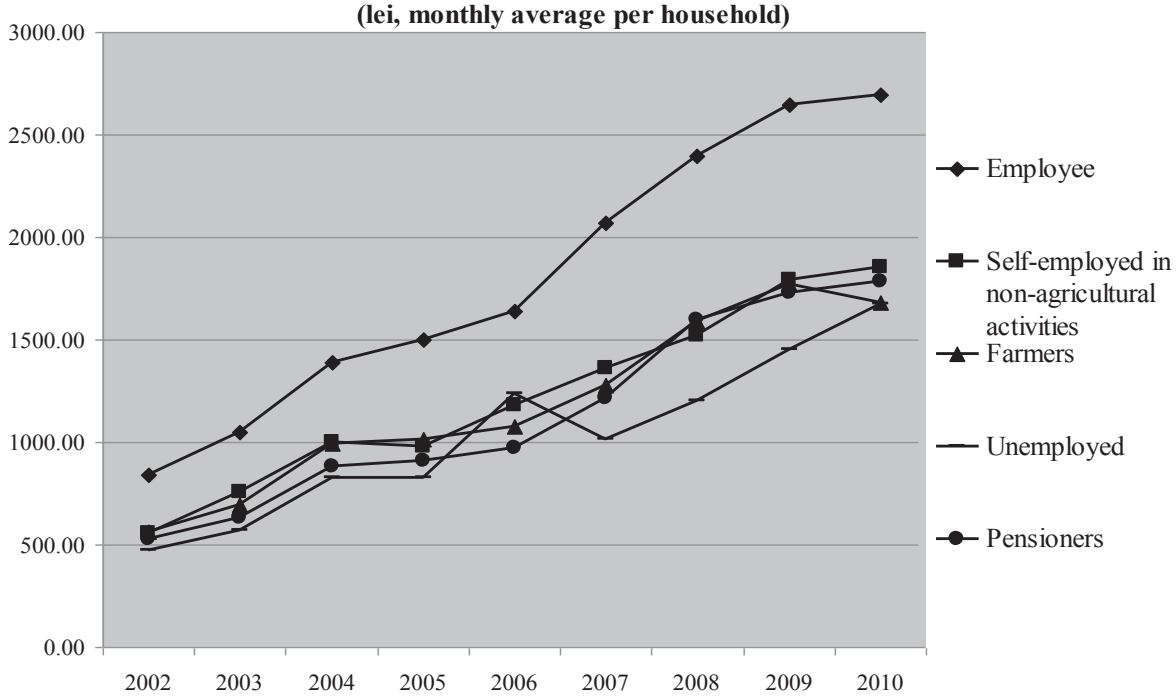
During the period 2002-2008 there was a pattern change in the household income structure in the rural area. Thus, the share of the equivalent value of consumption of agro-food products from own resources decreased gradually from 43% in 2002 to 28.5% 2008. At the same time, the share of gross salaries increased from 21% in 2002 to 29.5% in 2008, while the income from social provisions became also more important.

The employees households have the highest income level, while the unemployed the lowest. The nominal income levels presented in fig.2 reveal the increasing gap between employee households and all other households. However the share of employees is only 35.7% of total employment in rural area, most of them working in non-agricultural activities. In the last years the income of pensioner households of has increased, reaching in 2008 a higher level compared to the income of farmers.

The reduction of labour force participation due to the downturn of production in non-agricultural activities, as well as the austerity measures have reduced the level of the household money income. The inertia of income in kind helped the rural households to face a milder shock of the crisis compared to urban households. The narrowing of income inequality was expected in Romania, due to the fact that during the crisis top incomes have decreased and there is a strong social and political pressure to protect low incomes [6].

Considering the above mentioned trends, the research question is about the identification of the main variables which influence the rural household income during the economic crisis. Changes in a short run period cannot significantly influence the rural production and employment structures. However the downturn of GDP alongside with the reduction of demand for goods and services in rural areas affects directly the employees. The fall in GDP also reduces the financial support for investments in agriculture and induce a negative impact. The last factor to be considered is employment in agriculture, knowing that a shift towards agriculture still is a survival strategy for families.

Fig.2: Total income by household category in the rural area in Romania, 2002-2010 (lei, monthly average per household)



*Total income per household includes the income in kind
Source: National Institute of Statistics, 2002-2010

The econometric analysis

The econometric model is searching for the impact of the macroeconomic trends on the critical economic variables. i.e. investment in agriculture and rural household income, which are significant parameters for the progress of the rural area. In order to find the correlations during economic growth followed by the economic down-turn, we selected relevant indicators (table 1):

Table 1: The economic variables (previous year = 100%)

	GDP	Net investments Total (Inv_tot)	Civil employment Total (Po_tot)	Net investments in agriculture, forestry and fishing (Inv_agr)	Employment in agriculture (Po_agr)	Total income per rural household – monthly average (Ven)
2002	105.08	107.7	97.26	197.58	86.07	101.13
2003	105.24	108.28	99.72	54.54	95.78	106.81
2004	108.49	103.37	99.18	50.00	91.33	125.33
2005	104.15	102.98	101.84	113.81	101.51	95.22
2006	107.87	133.84	100.94	121.09	94.01	103.20
2007	106.32	111.27	103.03	102.66	97.93	117.31
2008	107.30	105.13	100.24	136.08	98.21	115.85
2009	92.92	72.65	96.15	83.01	99.71	103.84
2010	98.40	92.35	99.52	87.21	101.2	95.20

Source: Own calculations based on data from the National Institute of Statistics.

First regression model

The first correlation relies on the assumption that the variation of GDP, as well as the change in investment and employment, have an impact on the investment in agriculture. Generally, it is expected that a higher GDP, accompanied by higher investment and employment create favorable conditions and resources for the modernization of a traditional economic branch with high potential. However, the increase in employment is favorable only if labor productivity does not decrease. The model also uses the variable "employment in agriculture".

The impact of GDP, investment and employment on the investment in agriculture (dependent variable) is reflected by the following model:

LOG(INV_AGR)=C(1)+C(2)*LOG(PIB)+C(3)*LOG(INV_TOT)+C(4)*LOG(PO_TOT)+C(5)*LOG(PO_AGR)

The regression equation for the data is therefore:

INV_AGR= 21,82+6,74PIB+1,65INV_TOT+4,76PO_TOT-3,40PO_AGR

Table 2: Results of the first model

Dependent Variable: LOG(INV_AGR)
Method: Least Squares
Date: 09/03/12 Time: 14:22
Sample: 2002 2010
Included observations: 9
LOG(INV_AGR)=C(1)+C(2)*LOG(PIB)+C(3)*LOG(INV_TOT)+C(4)*LOG(PO_TOT)+C(5)*LOG(PO_AGR)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	21.82624	63.11750	0.345803	0.7469
C(2)	6.744004	10.25181	-0.657836	0.5466
C(3)	1.652241	3.027198	0.545799	0.6142
C(4)	4.764303	25.70363	0.185355	0.8620
C(5)	-3.401038	8.923747	-0.381122	0.7225

R-squared	0.175808	Mean dependent var	4.573346
Adjusted R-squared	-0.648385	S.D. dependent var	0.433725
S.E. of regression	0.556857	Akaike info criterion	1.967164
Sum squared resid	1.240359	Schwarz criterion	2.076734
Log likelihood	-3.852240	Durbin-Watson stat	2.050151

The results show that an increase of GDP by 1% ceteris paribus determines an increase of investments in agriculture by 6.74%. An increase of employment at national level by 1% generates an increase of investment in agriculture but, on the other hand, an 1% increase of employment in agriculture determines a decrease of investment in agriculture by 3.4%. It seems that investment in agriculture is stimulated by higher income of persons employed in non-agricultural activities, which are able to finance agricultural projects. Higher employment in agriculture only substitutes the capital and discourages investments.

The positive value of the free term (21.82) shows that other variables not included in the model have a positive effect on the investment in agriculture. In table 2 the R-squared value indicates that only 17.58% variation of investment in agriculture can be explained by the five independent variables, while the rest of 82.42% of the total variation can be explained by other variables not included in the model.

The Durbin-Watson test provides the coefficient 2.05, which is near the value 2 and indicates that the residuals are not auto-correlated.

Second regression model

The second correlation is based on the assumption that the variation of GDP, as well as the change in total investment and employment, have an impact on the household income in rural areas.

The impact of GDP, investment and employment on the rural household income (dependent variable) is reflected by the following model:

LOG(VEN)=C(1)+C(2)*LOG(PIB)+C(3)*LOG(INV_TOT)+C(4)
*LOG(PO_TOT)+C(5)*LOG(INV_AGR)+C(6)*LOG(PO_AGR)

Table 3: Results of the second model

Dependent Variable: LOG(VEN)
Method: Least Squares
Date: 09/03/12 Time: 14:33
Sample: 2002 2010
Included observations: 9
LOG(VEN)=C(1)+C(2)*LOG(PIB)+C(3)*LOG(INV_TOT)+C(4)
*LOG(PO_TOT)+C(5)*LOG(INV_AGR)+C(6)*LOG(PO_AGR)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	5.375068	10.73831	-0.500551	0.6511
C(2)	2.286868	1.809241	1.263993	0.2955
C(3)	-0.657860	0.526052	-1.250561	0.2998
C(4)	-1.146293	4.327541	0.264883	0.8083
C(5)	0.062030	0.083822	-0.740015	0.5129
C(6)	0.551252	1.522939	-0.361966	0.7414
R-squared	0.638594	Mean dependent var		4.669691
Adjusted R-squared	0.036250	S.D. dependent var		0.095094
S.E. of regression	0.093354	Akaike info criterion		-1.670114
Sum squared resid	0.026145	Schwarz criterion		-1.538630
Log likelihood	13.51551	Durbin-Watson stat		1.610183

The regression equation for the data is therefore:

VEN=5,37+2,28PIB-0,65INV_TOT-1,14PO_TOT+0,06INV_AGR+0,55PO_AGR

The increase of GDP, investment in agriculture and employment in agriculture has a positive impact on the household income. It is remarkable that 1% increase of investment in agriculture determines only 0.06% of income change, due to the fact that the agricultural income is only 6-7% of the total income per rural household. The rural households depend in a higher degree on the own produced agricultural products, but this part represents the subsistence sector with rather low investment. The household income has a much higher sensitivity to GDP changes which allow an increase in salaries and social provisions in rural areas.

An increase of 1% of employment in agriculture generates an increase of only 0.55% of the household income, since the marginal labor productivity is low. Usually this is a subsistence solution which occurred again in 2010.

In table 3 the R-squared value indicates that 63.85% variation of total income per rural household can be explained by the five independent variables. Regarding the Durbin-Watson test, the coefficient 1.61, which is near the value 2, indicates that the residuals are not auto-correlated.

CONCLUSIONS

The rural area in Romania has specific characteristics determined by structural and traditional factors. The low household income level is closely connected to the low labor productivity in the main economic activities, while a significant share consists of the subsistence

economy. The sustained economic growth and Romania's adherence to the European Union have activated economic mechanisms for long term changes. Critical parameters for the modernization and catching-up of rural areas are the investments in agriculture and the increase in household money income.

The shock of the economic crisis affected differently the rural areas compared to the urban areas, since the decline of the GDP in predominantly rural areas was less severe. The paper focused on the estimation of the influence of macroeconomic variables such as changes in GDP, investment and employment rate on the investment in agriculture and on the average income of rural households.

The findings of the research reveal that investment in agriculture depends positively on the GDP and negatively on the employment in agriculture, but the cumulative impact of other factors not included in the list of variables is much higher. The household income has a high sensitivity to GDP variations which induce changes in salaries, social provisions and in the financial support for farmers. The relative slower reaction of the household income variable to the crisis proves that the subsistence role of the income in kind is still important and acts like an automatic stabilizer. The impact of investment in agriculture on household income is not significant. More important is the farmers' income directly influenced by the weather conditions and the by the financial support provided from public sources.

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