

INFLUENCE FACTORS OF REGIONAL HOUSEHOLD INCOME DISPARITIES IN ROMANIA*

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Abstract

The sustained economic growth in Romania during the period 2000-2008 was not accompanied by a regional convergence of the living standards. Specific factors, such as the persistence of regional specialization of employment and the dominance of subsistence households in rural areas still shape the regional disparities in economic performance. The economic crisis determined a decrease in the average household income, while the impact was unequally distributed by regions. The paper aims at measuring the cross-regional variation of the household income at NUTS2 level. In order to identify the specific factors which have mostly influenced the income changes, panel estimation is used.

Keywords: regional sector specialization, regional income disparities, influence factors of household income, panel estimation

JEL Classification: R11, R20, C23

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1. Introduction

There are several fundamental factors that are shaping the regional income distribution in a country. The expected regional convergence process does not occur since influence factors defined by the neoclassical theory as well as by the modern neoclassical convergence theory are conditioned by other forces, such as industrial structure, propensity to save, regionally asymmetric shocks etc. (R.Camagni, R.Capello, 2011).

In Romania one of the specific forces that still shape the production and employment structures is the long term resistance of the subsistence households in the rural areas, where agriculture is the main activity. As shown by Ailenei (2011) the problem of "rural burden" in development of Romania has historical traditions, leading to a significant structural gap between the western economies and ours.

In the communist era the reduction of rural area was forced by different means, most often destructive (systematization planning program). Even the transition to a market economy has failed to improve the situation given that urban-rural migration flows have exceeded the rural-urban flows in the last years, making the large share of the rural area a problem that blocks absolutely necessary structural economic mutations needed for modernization and European integration (Mosora, 2011). A consequence of the situation in rural areas is the rural/urban income gap, with strong influence on the regional income differential.

Nevertheless, the transition from an agricultural to a commercial society is expected, but the process is slow and negatively marked by a massive out-migration of young people. The debate about the relative contribution of agriculture to the reduction of income poverty (Christiaensen, L. et al., 2010) applies to Romania only in the sense that higher productivity in this sector and more opportunities in non-agricultural activities may contribute to poverty reduction in rural areas.

The recent economic crisis in Romania resulted in reduction of individual earnings. However, in addition to the money income, the household members have a significant part of income in kind, as well as income from transfers. Thus the rising inequality of earnings may

be partly compensated by means of other income sources. A narrowing of income inequality is expected in Romania also 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 (Molnar, M, 2009).

The issue of this paper is the identification of the main factors that had a major impact on the regional household incomes inequality since the EU integration process started, taking into consideration also the effects of the economic crisis. Our paper focuses only on changes of employment rate and labour specialization at regional level, assuming that the shock determined by the crisis on the labour market has implications on regional income inequality. The choice to use employment rather than unemployment relies on the fact that economically inactive people are not counted as unemployed, but the consequences of economic inactivity and of unemployment for household income are similar.

2. Data and methodology

Since Romania became member of the EU in 2007, a relevant period for analysis is 2005-2011 which includes short periods before and after the EU accession. The paper includes an empirical analysis based on data regarding household income from the Romanian Statistical Yearbook and the Household Budget Survey (National Institute of Statistics, 2011). The regional data are also provided by the publications of the National Institute of Statistics. Available data for 2009-2011 show the short run impact of the economic crisis on income at national and regional level (NUTS2).

Using an econometric model, this paper focuses on the correlation between household income and various influencing factors considered relevant for the analyzed period. The econometric study estimates an equation using panel data, which allows the empirical investigation to be made along several dimensions.

The regressions on panel data is a more recent and more complex econometric technique (Hsiao (2003) and Klevmarken (1989)) compared with time series simple regressions, as panel models refer to data containing observations with both a group (cross-section) and time (within-group) identifiers.

Models (Baltagi, 2005) that can be estimated using panel data tools can be written as:

$$Y_{it} = \alpha_{it} + \beta X'_{it} + \delta_i + \gamma_t + \varepsilon_{it} \quad (1)$$

Where Y_{it} is the dependent variable, X_{it} is a k dimensions regressors vector and ε_{it} are innovations for M cross units observed over T periods. δ_i and γ_t are specific effects (random or variable) for the cross section units or for certain time periods.

There are three classes of panel data models (Table 1).

Table 1: Types of models depending on the constant term specification

Without free term	$\alpha_{it} = 0$
Constant free term	$\alpha_{it} = \alpha$, identical term for all units
Fixed effects	$\alpha_{it} = \alpha_i$, different term for each unit
Random effects	$\alpha_{it} = \alpha_i$, $E(\alpha_i, \varepsilon_{it}) = 0$, consider the free terms as random variables

The presence of specific cross or temporal effects can be captured and analyzed using the techniques for fixed effects and random effects. Models containing effects in one or both dimensions can be specified. For example, a fixed effect in cross sectional dimension and a random effect for time dimension or a random effect in cross sectional dimension and a fixed effect for time dimension. It should be emphasized, however, that the random effects in both dimensions can be estimated only if the panel is balanced so that each cross section has the same set of temporal observations.

According to Diggle et al. (2002) a fixed effects model is a statistical model that represents the observed quantities in terms of explanatory variables that are treated as if the quantities were non-random. In the random effects models, either all or some of the explanatory variables are treated as if they arise from the random causes. In panel data analysis, the term fixed effects estimator (the within estimator mentioned above) is used to refer to an estimator for the coefficients in the regression model. When assuming fixed effects, a time independent effects for each entity that are possibly correlated with the regressors is imposed.

For our paper we chose the model with constant coefficients. In this model, the coefficients do not vary with time and refers to both the slope and the constant term. We chose it because it is a classical regression model and the variability is introduced by the error term. The software used to process the data is EViews. EViews process random effects models using techniques such as FGLS (feasible generalized least squares). It estimates panel equations using OLS (ordinary least squares) or instrumental variables method, with corrections for fixed or random effects in both cross sectional and time dimensions.

3. Macroeconomic trends

In the context of sustained economic growth in Romania during the period 2000-2008 income and consumption of households increased and this resulted in the improvement of the living standard of the population. Consumption was actually the engine of growth, since the rate of growth in consumption was significantly higher than the GDP growth rate (Figure 1). In 2008 they both increased at about the same rate, while in 2009 they both decreased severely as a result of economic crisis. In 2009 the contraction of consumption was even stronger. The GDP per capita variation was rather similar to the total GDP annual variation.

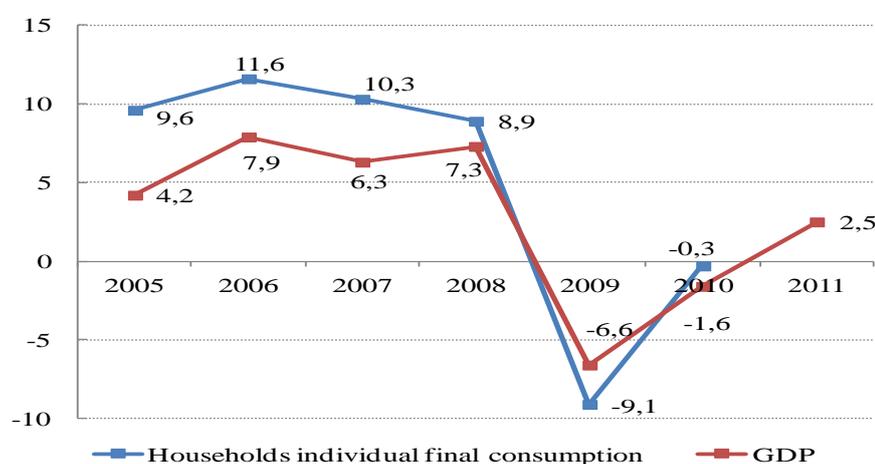


Figure 1: Growth variation of GDP in Romania, 2005-2011 (previous year = 100%)

Source: Romanian Statistical Yearbook 2010 and other data from the National Institute of Statistics (NIS), European Commission Forecast, February 2012

The 2009-2010 downturn in Romania was close to a “GDP disaster“. According to Barro and Ursúa (2008) GDP disasters are identified when the cumulative percentage drop (from peak trough) is at least 10 percent in real per capita personal consumption expenditure or real per capita GDP.

The employment rate in Romania has slowly increased, from 57.7% in 2005 to 59% in 2008, mainly due to a positive trend in urban areas (Figure 2). The decline of employment in rural areas is strongly marked by the diminishing over-employment in the subsistence agriculture.

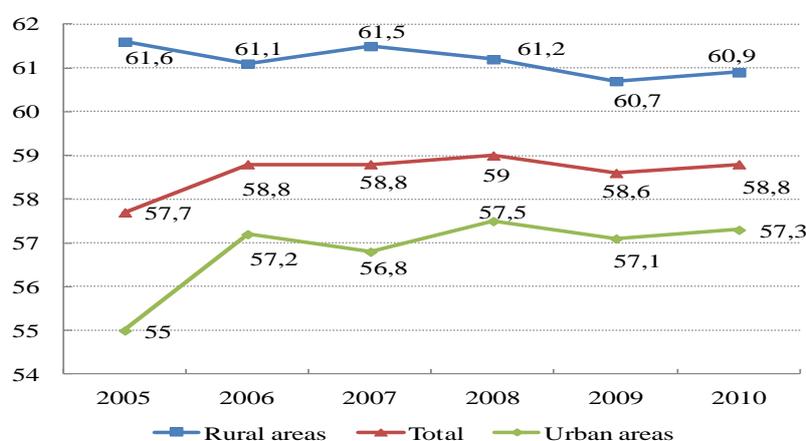


Figure 2: Employment rate (calculated for the working age population, 15-64 years) in Romania, by areas of residence, 2005-2010 (%)

Source: Romanian Statistical Yearbook 2010, NIS

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% increase of employment in agriculture proves that this activity still plays the role of occupational buffer. The employment rate in Romania has important regional variation at NUTS2 level (table 2).

Table 2: Employment rate in Romania, by region in the period 2005-2010

Region	2005	2008	2009	2010
North – West	56.0	56.4	55.2	57.7
Center	54.2	56.6	55.1	53.5
North – East	61.5	60.5	60.6	62.0
South – East	54.7	55.3	55.4	55.5
South – Muntenia	58.1	61.1	60.1	59.7
Bucharest – Ilfov	59.4	63.3	63.8	64.3
South - West Oltenia	60.1	60.0	59.9	59.2
West	56.6	59.3	58.6	57.9

Source: Regional economic and social marks – territorial statistics 2009 and 2010, Romanian Statistical Yearbook 2010, NIS

All regions have increased their employment rate in the period 2005-2008, except North-East and South-West Oltenia, where agriculture is the dominant activity. During the years of crisis 2009 and 2010 there were employment fluctuations with no similarity among regions. The most developed region Bucharest-Ilfov continued to increase the employment rate and continue its favourable path. The region North-East also increased the employment rate, mainly for its attraction to subsistence agriculture in times of economic constraints.

4. Regional sector specialization of employment and economic performance

Increasing employment rates are generally a positive sign since they show that the working age population relies more on income sources based on work. The regional income differential depends not only on the employment rate, but also on the type of the dominant economic activity which can be estimated by the sector specialization.

The regional sector specialization of employment can be identified by means of the location quotient. Here the location quotient approach consists in comparing the NUTS2 region with the national average for each sector (agriculture, industry, constructions and services). The location quotient for a specific sector and a specific region is greater than 1.0 when employment in that sector tends to be over-represented in that region and therefore as being specialized in that sector.

The calculations refer to civil employment by activity of national economy at the end of

year (table 3).

Table 3: Regional specialization of employment, 2005 and 2009

Region	Location quotient							
	Agriculture, forestry and fishing		Industry		Constructions		Services	
	2005	2009	2005	2009	2005	2009	2005	2009
North – West	1.09	1.07	1.04	1.10	0.67	0.86	0.92	0.91
Center	0.84	0.83	1.21	1.29	0.83	1	1	1
North – East	1.34	1.38	0.79	0.81	0.67	0.86	0.87	0.84
South – East	1.09	1.10	0.92	0.95	1	1.14	0.95	0.93
South – Muntenia	1.25	1.28	1	1.05	0.67	0.86	0.82	0.81
Bucharest – Ilfov	0.16	0.10	0.83	0.76	1.83	1.86	1.64	1.60
South –West Oltenia	1.31	1.34	0.88	0.90	0.83	1	0.82	0.79
West	0.84	0.86	1.25	1.29	0.83	0.86	1	0.98

Source: own calculations based on data from the Romanian Statistical Yearbook, Time series 1990-2009, NIS

The values of the location quotients show the following predominant specialization of regions in 2009 (table 3):

- Agriculture, forestry and fishing: North – East (1.38), South – West Oltenia (1.34), South – Muntenia (1.28);
- Industry: Center (1.29); West (1.29);
- Services: Bucharest-Ilfov (1.6)
- Constructions: Bucharest-Ilfov (1.86) and South-east (1.14)
- Constructions and agriculture: South-East (1.14 and 1.1)
- Industry and agriculture: North-West (1.1 and 1.07).

The specialization of employment the period 2005-2009 has not significantly changed, despite the fall in agriculture's share in the regions. The persistence of the employment specialization patterns was also a characteristic at regional level within the EU before 2004 (Marelli, 2004). The effects of the economic crisis in Romania have produced only a slight shift from industry to agriculture in the regions North-East and South-East.

The disparities in economic performance are closely connected to the regional specialization of employment. Activities with lower productivity, such as agriculture, allow only a lower level of the regional GDP per capita and a slower dynamic (table 4).

Table 4: Disparities of regional GDP per capita and changes in the period 2005-2009

Region	2005	2009	2010	Changes 2009 to 2005 (%)	Changes 2010 to 2009 (%)
	National GDP per capita =100%				
North – West	94	91	91	+19	-1.3
Center	98	97	95	+8	-3.5
North – East	67	63	59	+8	-2.2
South – East	86	80	80	+18	+0.9
South – Muntenia	83	85	88	+9	-4.1
Bucharest – Ilfov	221	236	240	+10	+0.6
South - West Oltenia	78	76	74	+10	0
West	113	110	111	+12	0

Source: own calculations based on data from the Regional economic and social marks – territorial statistics 2009 and 2010, NIS

In Romania, according to the negative deviation from the average national GDP per capita, the ranking of the least developed regions is: North-East, South-West-Oltenia, South-East and South-Muntenia. These regions have a high degree of ruralization and specialization in agriculture compared to the average level in Romania. Two of these four regions have even worsened their income position to the national average during the period 2005-2010.

5. Households income variation

The analysis of total income by type of household shows that the employees households have the highest income level, while the unemployed the lowest. In the last years the pensioners' households average income has increased, reaching in 2008 a higher income level compared to the income of farmers households.

The annual variation of the real income in the period 2005-2010 (Table 5) shows that in 2008 there is a significant increase of income in the case of pensioners' households who benefited from increase of pensions as a result of political decisions. These decisions were meant to reduce the pensioner poverty. Farmers have particularly volatile income, mostly under the influence of changing weather conditions. For the farmers' households the period 2008-2009 was rather favourable, counting also the positive effects of the Common Agricultural Policy (Zahiu et al., 2010, pp:205-207).

Table 5: Annual changes of total real income per household, by types of households, 2005-2010 (previous year = 100%)

	2005	2006	2007	2008	2009	2010
Total households	2,4	7,3	16,1	17,2	3,7	-6,2
Employees	4,3	6,9	16,8	12,7	3,9	-6,1
Self-employed*	10,8	6,9	-4
Farmers	-6,2	0,06	13,5	15,8	8,8	-13,5
Unemployed	0	19,4	2,8	5,5	18,7	-3,5
Pensioners	0,3	6,4	16,3	23,9	4,9	-4

*self-employed in non-agricultural activities

Source: calculations based on data from the Romanian Statistical Yearbook time series 1990-2009 and Coordinates of living standard in Romania. Population income and consumption, 2010, NIS

It is remarkable that in 2009 there was an income increase for all types of households, even if the GDP went down by 6.6%. This reflects the rigid response of the labour market to changes in demand for goods and services. In addition, in 2008 and 2009 Romania had local and respectively parliamentary elections which were accompanied by financial stimulation of lower income households, as well as increase of the number of employees in the public administration. The shock of the crisis became obvious in 2010, when the salaries in the public sector decreased by 25% in the second half of the year. Also about 19000 persons were released from the public administration and defence and social insurance of the public sector.

Gross salaries are the main component of total income. The decline of its share during the crisis has been compensated by a relative increase of income from social provisions (table 5). The equivalent value of self-consumption in Romania makes an important difference between the income sources in Romania and in other EU countries. This indicator is significant in the analysis of the economic behaviour of households. The share of self-consumption in the total income decreased from 17.3% in 2005 to 13.7 in 2009 and increased slightly to 14.2% in 2010. Parts of the employees who lose their jobs decide to return to the subsistence economy, especially if they live in small towns and have close relations to their extended family in rural areas.

The regional disparities of household income per person (table 6) show a close relation to the disparities of regional GDP. However, the ranking of the two regions Bucharest-Ilfov and West is much better in terms of GDP creation than in terms of household income per person. All other regions have the ranking of household income above the ranking of their regional GDP. It is obvious that additional factors of influence on household income have to be considered.

Table 6: Disparities of total household income per person, by region, in the period 2005-2010

Region	2005	2009	2010
	National average of total income per person=100%		
North – West	101	97	99
Center	105	99	100
North – East	89	89	86
South – East	91	90	88
South – Muntenia	91	96	101
Bucharest – Ilfov	140	148	143
South - West Oltenia	93	88	91
West	104	107	104

Source: Own calculations based on Romanian Statistical Yearbook time series 1990-2009 and Co-ordinates of living standard in Romania. Population income and consumption, 2010, NIS

6. Influence factors of regional income disparities

For this study we used regional statistical data, while the time period envisaged tried to capture both the periods of economic expansion and recession.

The first factor considered was the regional GDP per capita. It is expected that an increase in the level of this indicator has a positive impact on the household average income.

A second factor of influence aims at the relationship between employment and income. Initially, we tried to determine the influence of average employment rate on the household income. The results obtained using an econometric model showed that the two variables do not correlate. This can be explained by the fact that high levels of employment in low productivity activities result in a low income. It does not mean that a negative correlation exists, because during the period with economic growth in agricultural regions there was an

increase in urban employment in activities with high productivity and an employment decrease in agriculture.

To highlight the importance of labour employment as a determinant of household average income, the vacancies rate was chosen as the independent variable.

We estimate a regression model using data from the Statistical Yearbook over the period from 2005-2010. The model specification is given by:

$$\log[(V)_{i,t}] = \alpha_{i,t} + \beta_1 \log[(PIB)_{i,t-1}] + \beta_2 \Delta(RL_{i,t}) + \varepsilon_{i,t} \quad (2)$$

Where:

β_1, β_2 - coefficients of the independent variables;

$V_{i,t}$ - total income of main household categories (monthly per person), for region i in time t ;

$PIB_{i,t-1}$ - GDP per capita of region i in time previous to t ;

$RL_{i,t}$ - vacancies rate of region i in time t .

$\varepsilon_{i,t}$ - is a white noise, random variable, identically and independently distributed.

Total income includes:

- money income by origin sources (salaries, income from own account activities, sales, unemployment benefits, pensions, children allowances, scholarships and other allowances of social protection, income from properties a.s.o.);
- equivalent value of free or lower cost provisions (sales and services), estimated at selling price of offerer;
- equivalent value of consumption of food and non-food products from own resources (production, stock a.s.o.), determined based on monthly average prices of respective products.

Vacancies rate represents the ratio between the numbers of vacancies and total number of jobs (occupied and vacant, excluding the blocked ones or meant for promotion inside the enterprise or institution), expressed as percentage.

Equation (1) estimates a regression model for the logarithm of income using the GDP logarithm in the $t-1$ period and the first difference of vacancy rate. The econometric model considered suitable for studying the above relationship is a dynamic panel model that captures the impact of productivity and labour demand on income changes.

The obtained results are as follows:

$$\log[(V)_{i,t}] = 1,75 + 0,48 \log[(PIB)_{i,t-1}] - 0,13\Delta(RL_{i,t}) + \varepsilon_{i,t} \quad (3)$$

The coefficient $\beta_1 = 0.48$ associated with GDP in the $t-1$ period suggests a direct relationship between the two variables. On the other hand, coefficient $\beta_2 = -0.13$ suggests a negative relationship between vacancy rate and income. The coefficients interpretation is as follows: if the GDP per capita increases by 1% then the income increases by 0.48%. On the other hand, when the vacancy rate increases by 1%, then the income decreases by 0.13%. Basically, the coefficient values of the independent variables are elasticities. The result is consistent with the economic theory, stressing the importance of both productivity and labour demand in the formation of income.

Note that GDP in the previous year, $t-1$, has a significant impact on the income in year t . This situation is explained by the inertia of income formation and the role of policy makers for the period considered for Romania.

F test of the null hypothesis shows that the model is valid. Also, the link between the three variables is a strong and positive and statistically significant, as shown by the probability associated with the t test. Moreover, the two variables, GDP per capita and the change in vacancy rate, explains some quite important part (86%) of the change in income.

Table 7: Estimation results for equation 1

Dependent Variable: LOG(V)				
Method: Panel Least Squares				
Sample (adjusted): 2006 2010				
Periods included: 5				
Cross-sections included: 8				
Total panel (balanced) observations: 40				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.752293	0.396435	4.420129	0.0001
LOG(PIB(-1))	0.481221	0.040738	11.81254	0.0000
D(RL)	-0.130288	0.036380	-3.581290	0.0010
R-squared	0.870342	Mean dependent var	6.499841	
Adjusted R-squared	0.863333	S.D. dependent var	0.257241	
S.E. of regression	0.095098	Akaike info criterion	-1.795778	
Sum squared resid	0.334615	Schwarz criterion	-1.669112	
Log likelihood	38.91555	Hannan-Quinn criter.	-1.749979	
F-statistic	124.1827	Durbin-Watson stat	1.652381	
Prob(F-statistic)	0.000000			

7. Conclusions

The problem of "rural burden" in development of Romania consists of the persisting high employment in the subsistence agriculture. This keeps a significant structural gap between rural and urban areas and is a source of increasing GDP per capita differences at regional level. The regional GDP differential depends not only on the employment rate, but also on the type of the dominant economic activity which can be estimated by the sector specialization. Regions with higher employment rate in low productivity activities, such as agriculture, allow only a lower level of the regional GDP per capita and a slower economic progress. In connection to the GDP per capita, there are also regional differences in

household incomes. However the social and political pressure aiming at protecting lower incomes has partly compensated the negative effects of the economic crisis in 2009. The incomes of all types of households have decreased in 2010.

The results of the econometric model point to the GDP per capita and the change in vacancies rate as the main influence factors on the regional average household income during the period 2005-2010. The two variables explain 86% of the change in household income. The coefficient $\beta_1 = 0.48$ associated with GDP in the $t-1$ period suggests a positive relationship between GDP per capita and household income. On the other hand, coefficient $\beta_2 = -0.13$ suggests a negative relationship between vacancy rate and household income. The result is consistent with the economic theory, stressing the importance of both participation in the labour market and productivity in the formation of income.

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