

# Regional aspects of economic resilience in Romania, during the post-accession period<sup>1</sup>

Authors:

Gheorghe ZAMAN\*  
George GEORGESCU\*\*

*Abstract.* The paper focuses on the issue of regional resilience to the economic crisis impact in the case of Romania, taking the county as territorial unit of observation. Based on the idea that the shock of a crisis spreads asymmetrically in the territory, with different contagion effects, the study advances a new approach to the speed and duration of GDP decline recovering. Data analysis shows that, at macroeconomic level, Romania has not proved resilient to the crisis impact, after two years of recession and a recovery period of 4 years barely succeeding in 2014 to return to the 2008 GDP level. The research highlighted the differentiated recovery duration of the economic decline in territory, as in 2014 many counties had to recover in the coming years the remained GDP gaps, up to 10 pp or even more. The study paid a specific attention to the crisis impact on employment, focusing on the R&D sector, revealing the endogenous growth generating potential at county level.

*JEL Classification:* G01; I28; O18; O33; R10; R12; R58

*Keywords:* global crisis; regional economic resilience; economic decline recovery; employment; knowledge-based re-industrialization

---

<sup>1</sup> A revised version of the paper pre-published, under the title "Resilience to crisis and GDP recovery at county level in Romania", in MPRA Working Papers No. 63246, March, 2015. A part of the paper has been presented at the International Conference EINCO 2015, Oradea, 29-30 May 2015.

\* Ph.D., Professor, Corresponding Member of the Romanian Academy, Scientific Researcher I, Institute of National Economy, Romanian Academy, e-mail: gheorghezaman@ien.ro.

\*\* Ph.D., Senior Researcher, Institute of National Economy, Romanian Academy, e-mail: george.georgescu@eximbank.ro

## 1. Introduction

Generally speaking, the economic theory, methodological approaches and development policies were concerned more with the study of growth and the analysis of its fundamentals and drivers. Fewer researches focused on the issue of recessions caused by the crisis impact and on the related economic decline recovery. For the time being, there is not a clear perception of differences between recovering and returning to pre-crisis levels, also because of the presence, more difficult to detect, of some economic flexibilities against rigidities that may hide the real impact localization. Some problems of clear-cut delimitation are also arising in order to reveal differences between economic crisis, downturn and recession.

In the case of deep financial crises, Reinhart and Rogoff (2009) have shown that an economy usually needs more than four years to reach the pre-crisis GDP per capita. Some authors (Papell and Prodan, 2011) showed that in emerging countries, although suffering from a greater magnitude of decline, the duration of returning to potential GDP is lower compared to advanced countries in the case of financial crises, such as the one triggered in 2007.

However, in terms of real GDP growth, if we are looking at country unions having a single market, such as the EU, with a high level of interconnectedness, it was observed that the more developed countries (Germany and France, for instance) succeeded to recover the GDP decline of 2009 in only one or two years, as compared to a much longer period of recovering in other less advanced countries, from Central and Eastern Europe (except for Poland, which recorded a steady economic growth), under the same circumstances.

Very often, expectations regarding the decline recovery duration are not met. In this regard, referring to the economic recession after the last financial crisis, Bernanke (2013) argued that a stronger rebound was hindered by a variety of headwinds (decreasing investments, credit conditions tightening, increasing risk aversion and uncertainty) which reduced the potential growth rate.

Questioning about the impact of severe downturns on the GDP trend, Martin *et al.* (2014) found that recessions tended to depress the level of output on the long run because of entrenching the crisis effects on demand, instead of returning to pre-crisis trend, being more likely a sustained deviation from it. Otherwise, the IMF experts (2014) have recently warned that the global economy may never return to the pre-crisis growth, under the same circumstances.

In this context, there is a basic idea related to the required velocity rate, i.e. an economy growth rate sufficiently high for overcoming recession or a sluggish recovery, similar to the speed needed to break from the gravitational attraction in physics.

Obviously, the economic recovery following a crisis depends mainly on the resilience to external or internal shocks, the magnitude of the recession, the development level, the stage of the business cycle, which is specific to each country. Moreover, the shock of a crisis impact spreads asymmetrically throughout the territory, with different contagion effects.

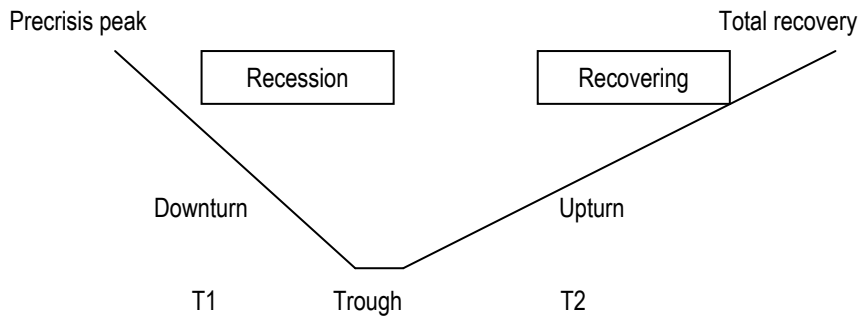
A study under the EPSON Programme published in 2014 regarding the territorial dynamics following the financial crisis highlighted a series of factors associated with a higher resilience of EU regions, among them more diversified exports, the presence of MNC, innovative and higher skilled labor force. According to EPSON classification, not resilient regions in terms of GDP and employment have been defined those regions that have begun their recovery but not having achieved the pre-crisis levels and/or remained in decline. Across European territory, the peripheral regions of Southern Europe, including Romania, were affected by longer and deeper seated crisis effects.

The intention of this paper is neither to design a typology of the GDP decline by counties nor to point out the recovery ways, but mainly to draw attention that, for reasons of growth sustainability, not only the expansion period of an economy is of high importance but also the decline duration following crisis, from the viewpoint of development pattern and of influence factors under the circumstances of external and internal shocks.

The economic decline recovery can be assessed, from a statistical viewpoint, as returning to pre-crisis levels, but this recovery takes place in new circumstances that suppose, to a lesser or greater extent, the occurrence of new seeds of growth and innovation, qualitatively higher.

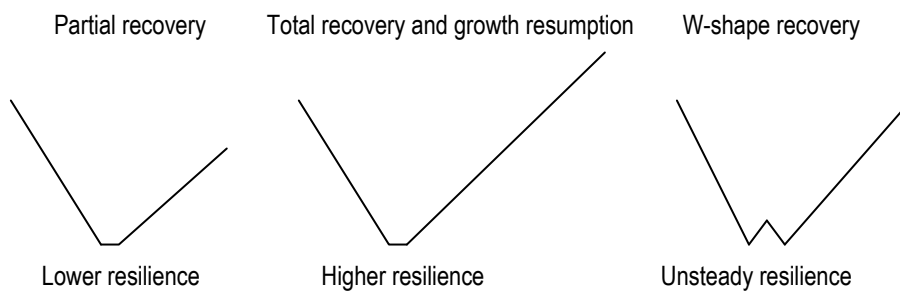
As reflected in Figure 1, in the case of Romania, the GDP decline in 2009 and 2010 (T1) was recovered only in 2014, requiring 6 years (T2), which means a low economic resilience to the crisis shock and the weak capacity of the country to return to its precrisis macroeconomic trend lines.

*Figure 1 - Romania's GDP postcrisis decline recovery*



The GDP recovery process at county level in Romania has been characterized, synthetically, by three specific cases, as described in the Figure 2, i.e. counties with lower resilience, undergoing a partial recovery, to various degrees, during the postcrisis period; counties with higher resilience, overcoming the GDP decline and succeeding to resume the economic growth, after more or less postcrisis years; counties with unsteady resilience, alternating postcrisis years of recession and recovery.

*Figure 2 - Resilience and speed of GDP decline recovery at county level*



Theoretically, a more diversified and dense businesses tissue (industry, agriculture, services) should insure a greater resilience, both at national and regional/county levels and *vice. versa*. As shown further, in the case of Romania, even several relatively more developed counties (as GDP per capita) have not

always showed a higher resilience and recovery capacity against the crisis impact, most of the counties that have not recovered the GDP decline were also deprived of consistent business tissues.

All in all, in our opinion, the duration and amplitude of the recovering process depend on several interconnected factors in a complex "melting pot" of creative destruction activities.

## **2. The economic decline of GDP in Romania caused by the crisis: intensity and recovery by county**

The territorial development of the national economy represents a major goal of any strategy of sustainable growth process, under nominal and real convergence objectives, in order to reduce the gaps between regions.

The recent international economic and financial crisis has had a severe regional impact in Romania, resulted in GDP decreases at county level, to a greater or lesser extent, which has undoubtedly weakened the resistance capacity, the economic resilience of the country and its territorial units.

The main objective of the research lies in highlighting the influence of the crisis, during the 2009-2010 peak periods, on the GDP of Romania's 42 counties. The evolution of the GDP has been analyzed throughout the 2008-2014 period, based on the idea that, for a national economy, it is important to understand how the crisis and the recession, affect the economic downturn, which may be higher or lower for longer or shorter periods.

In this sense, a special importance of the regional economies **resilience** (resistance) to crisis shocks and their ability to return to pre-crisis levels by implementing adequate recovery policies was attached, being analyzed through the capacity of GDP decline recovery in the aftermath of the crisis.

As it is known, in Romania, the crisis had one of the strongest adverse effects, in terms of the intensity and the duration of recovery time. Understanding the regional issues in this regard may provide guidelines for economic and social decision making policies in general and at territorial level in particular.

Our research tried to identify certain features of the counties, depending on the size of annual and total economic decline during 2008-2014 and the recovery/non-recovery of that decline during different periods of time (1 – more than 6 years).

To this end, we used GDP fixed-base indexes at county level, at comparable prices, taking as a base year 2008 = 100, which was the pre-crisis year in Romania with an increase of 7.3% of GDP compared with 2007.

## **2.1. The intensity of the economic decline in 2008-2014 at county level**

The analysis of the data in Annex 1 enables us to define some problems, aspects and conclusions, useful for understanding the impact of the crisis spread in Romania, directly and indirectly related to the promotion of regional endogenous growth model.

### **The GDP pre-crisis decline in 2008**

Even if, in 2008, at the macroeconomic level, a GDP increase of 7.3% was recorded, in a number of 15 counties, the GDP declined, as follows (in ascending order): Valcea (-6.5%); Dambovita (-5.1%); Alba (-4.8%); Suceava (-3.9%); Cluj (-3.8%); Arad (-3.3%); Covasna (-2.1%); Neamt (-1.8%); Salaj (-1.4%); Satu Mare (-1.3%); Caras-Severin (-1.2%); Maramures (-1.0%); Harghita (-0.8%); Botosani (-0.5%); Mures (-0.3%). This economic decline (between -6.5% and -0.3%) can be considered as preceding the crisis that would follow to include a larger number in the years that were to come.

### **The year 2009 - peak of the crisis affecting 39 counties**

The year 2009 witnessed a GDP decline of -6.6% at macroeconomic level, which meant for Romania a crisis peak, 39 counties registering a magnitude of the economic shock, between -12.2% and -1.1% compared to 2008, as follows (in descending order): Calarasi (-12.2%); Olt (-12.1%); Bucuresti (-11.7%); Galati (-11.4%); Valcea (-9.8%); Buzau (-9.7%); Bihor (-8.8%); Vaslui (-8.6%); Tulcea (-8.4%); Hunedoara (-7.8%); Mures (-7.7%); Alba (-7.5%); Timis (-7.3%); Vrancea (-6.9%); Arad (-6.7%); Neamt (-6.7%); Ialomita (-6.4%); Teleorman (-6.1%); Satu-Mare (-6.0%); Ilfov (-5.7%); Dambovita (-5.7%); Iasi (-5.7%); Bacau (-5.5%); Mehedinti (-4.8%); Salaj (-4.6%); Harghita (-4.5%); Botosani (-4.5%); Dolj (-4.4%); Cluj (-4.4%); Covasna (-4.3%); Maramures (-3.1%); Sibiu (-2.9%); Giurgiu (-2.9%); Bistrita Nasaud (-2.8%); Constanta (-2.5%); Prahova (-2.4%); Braila (-1.7%); Brasov (-1.4%); Suceava (-1.1%).

In 2009, modest GDP increases were recorded only in Arges (+0.5%), Caras Severin (+0.6%) and Gorj (+4.7%), leading thus to the conclusion of their relative resilience to external shock of the crisis. It is worth mentioning that counties at higher development levels suffered sharper GDP decline (Bucharest, Galati, Timis, Ilfov, Iasi).

### **The year 2010 - crisis effects continuing in 25 counties**

Both at macroeconomic level and in 25 counties, in 2010 there is a further decline in GDP, which highlights the expansion of the crisis effects in Romania, while in other EU countries the economic recovery had started. The GDP decline

in 2010 compared to 2009 ranged between -14.3% and -1.0%, affecting the following counties (in descending order): Braila (-14.3%); Prahova (-14.2%); Bistrita-Nasaud (-11.4%); Arges (-10.5%); Covasna (-9.9%); Neamt (-8.1%); Harghita (-7.3%); Teleorman (-6.8%); Botosani (-6.5%); Suceava (-6.4%); Vaslui (-5.8%); Ilfov (-5.8%); Valcea (-5.7%); Mures (-5.3%); Dolj (-4.5%); Satu Mare (-5.3%); Hunedoara (-4.4%); Sibiu (-4.2%); Salaj (-3.8%); Bacau (-2.6%); Maramures (-2.4%); Caras-Severin (-1.7%); Cluj (-1.5%); Bihor (-1.0%). The other 17 counties recorded a GDP increase in 2010 compared to 2009, which mostly ranged from 7% to 0.2%, which means rather a slight recovery of economic growth after large decreases compared to the previous year.

### **The year 2011 - beginning of recovery**

With a GDP growth of 2.2% at the national level, the year 2011 witnessed the beginning of the economic recovery, sustained by higher or lower GDP increases (between 7.9%-Buzau and 0.3%-Bucharest) in 40 counties. Overall, the weak upturn of the economic growth in most counties revealed by relatively modest GDP increases was not a strong economic recovery factor after the decline in post-crisis years. Only two counties recorded a rather significant decrease in GDP in 2011 compared to 2010, respectively Cluj (-5.4%) and Mehedinti (-2%), which continued their prolonged economic downturn.

### **The year 2012 - a modest GDP growth**

Whereas at national level the GDP stalled (a slight increase of 0.6%), in 25 counties the economic growth turned negative, only 17 counties continued their upswing. Even if the Municipality of Bucharest witnessed a GDP increase of 3.3%, the prevalence of counties facing an economic decline in 2012, showed the longlasting duration of the recovery in most of the country.

### **The year 2013 – re-launching growth in almost all counties**

At macroeconomic level, GDP grew by 3.5%. Increases above the national average were found in the following counties (more important): Dolj (22.2%); Sibiu (8.4%); Arges (8.4%); Timis (6.8%); counties with a GDP decrease were Gorj (-6.8%), Valcea (-1.2%) and Bacau (-0.8%).

### **The year 2014 – continued recovery**

The GDP growth at macroeconomic level in Romania is forecasted to 2.6%, sustained by relatively modest increases in all counties, between 0.8% (Tulcea) and 5.1% (Dolj). Most counties are expected to record GDP increases ranging from 2 to 3%. Only two counties are likely to record a slight GDP decrease, Harghita (-0.5%) and Mehedinti (-1.0%) respectively.

## 2.2. The duration and speed of economic decline recovery

The analysis of GDP decline recovery at the county level, following the effects of the financial and economic crisis in 2009 and 2010, based on a set of relevant indicators, provides a series of benchmarks in terms of territorial economic resilience.

In order to assess the restoring capacity at county level we used **the indicator of the recovery duration<sup>1</sup> of GDP decline** between 2009-2014 compared to the base year 2008, by the following categories of duration: between 0 years (counties without crisis impact) and 5 years (counties without full recovering the GDP decline up to 2014):

- a) no crisis: Gorj (1 county);
- b) recovery in 2010: Brasov; Calarasi; Giurgiu (3 counties);
- c) recovery in 2011: Alba; Caras-Severin; Constanta; Dambovița; Iasi; Olt; Timis (7 counties);
- d) recovery in 2012: Dolj (1 county);
- e) recovery in 2013: Arad; Arges; Ialomita; Maramures; Sibiu; Suceava (6 counties);
- f) recovery in 2014 (forecast): Mures (one county);
- g) no total recovering up to 2014 (forecast): Bacau; Bihor; Bistrita-Nasaud; Botosani; Braila; Buzau; Cluj; Covasna; Galati; Harghita; Hunedoara; Neamt; Prahova; Salaj; Satu Mare; Teleorman; Tulcea; Vaslui; Valcea; Vrancea; Bucuresti; Ilfov (23 counties).

**Table 1 - The recovery duration of GDP decline between 2009-2014, by counties**

Recovery duration	0 years	1 year	2 years	3 years	4 years	5 years	Over 6 years
Number of counties	1	3	7	1	6	1	23

Source: authors' calculations based on NIS and NCP data.

<sup>1</sup> By the recovery period of GDP decline we understand the duration in years needed by a county to reach the 2008 level of the indicator. This calculation can be done also for other outcome indicators such as exports, turnover, productivity or effort indicators such as investment, employment, etc. respectively.



According to the above mentioned data, **23 counties had not recovered from the crisis by 2014**, which means that their GDP was still below the level of 2008. This is why we believe that, in Romania, the consequences of the crisis have not yet been fully removed, i.e. the economy is suffering from fragility and lack of resilience.

The size of the gap in percentage points (pp) that counties have to recover in order to achieve the GDP level of 2008 is very important to support the programs and policies for sustainable territorial development, including the activation of endogenous factors.

In Table 2, the size of the gap for the 23 counties without total recovering of the GDP decline up to 2014, grouped by three tiers is presented in descending order.

*Hence, the economic recovery requires urgent measures for all three categories of counties.*

**Table 2: GDP gap to be recovered after 2014 to achieve the level of 2008, by counties**

Gap to be recovered in the future	Counties
<b>Tier I</b> <b>Small gap:</b> up to 5 pp	Tulcea (0.6 pp); Vrancea (0.6 pp); Bihor (0.8 pp); Galati (0.9 pp); Botosani (1.2 pp); Salaj (1.4 pp); Bacău (2.1 pp); Satu Mare (2.4 pp); Buzau (2.6 pp); Hunedoara (2.7 pp); Bucuresti (4.2 pp) – 11 counties
<b>Tier II</b> <b>Medium gap:</b> between 5-10 pp	Bistrita-Nasaud (5.8 pp); Ilfov (5.4 pp); Prahova (5.7 pp); Neamt (7.4 pp); Harghita (8.2 pp); Teleorman (8.4 pp);– 6 counties
<b>Tier III</b> <b>Wide gap:</b> over 10 pp	Vaslui (10.5 pp); Covasna (12.5 pp); Mehedinti (13.6 pp); Cluj (14.8 pp); Braila (16.2 pp); Valcea (16.7 pp);– 6 counties

Source: authors' calculations based on NIS and NCP data.

In our opinion, the counties in tier I should be supported mainly by local government interventions, completed by central government actions, the counties in tier II, mainly by the central government budget and the counties in tier III, which were very affected by the negative impact of the crisis, by specific interventions from the part of both central and local governments. All these supporting measures should focus on the investments increase, reviving the local business environment and improving the local public governance, by attracting also, to this end, the disposable European funds (ESI, EAFDR, FEAGA).

The data in Table 2 also highlights, in descending order, the counties with low, medium and very low resilience in Romania, which requires the development of strategies specific to every region/county, aimed at strengthening the resilience to external shocks and at re-launching the sustainable endogenous growth.

The complex concept of economic resilience involves not only the resistance to external/internal shocks but also the recovery of social and economic damages, prejudices and losses caused by these shocks, in a certain period which implicitly leads to the characterization of the process by the indicator **speed of the decline recovery (SDR)**, calculated by means of the average annual GDP growth (Table 3).

**Table 3. Classification of counties by the speed of the decline recovery (%)**

County	Category I higher resilience	County	Category II lower resilience
	Average annual rate 2008-2014		Average annual rate 2008-2014
Giurgiu	4.57	Valcea	-3.01
Dolj	4.43	Braila	-2.91
Brasov	2.40	Cluj	-2.64
Timiș	1.91	Mehedinti	-2.41
Constanta	1.78	Covasna	-2.21
Caras-Severin	1.76	Vaslui	-1.84
Calarasi	1.74	Teleorman	-1.46
Alba	1.56	Harghita	-1.42
Iasi	1.42	Neamt	-1.28
Suceava	1.38	Bistrita-Nasaud	-0.99
Gorj	1.33	Prahova	-0.98
Arad	1.28	Ifov	-0.93
Maramures	1.19	Bucuresti	-0.72
Sibiu	1.10	Hunedoara	-0.46
Olt	0.84	Buzau	-0.45
Dambovita	0.55	Satu Mare	-0.40
Mures	0.31	Bacau	-0.36
Arges	0.20	Salaj	-0.24
Ialomita	0.12	Botosani	-0.21
		Galati	-0.16
		Bihor	-0.14
		Vrancea	-0.11
<b>ROMANIA</b>	<b>0.14</b>	Tulcea	-0.10

Source: authors' calculations based on NIS and NCP data.

Thus, in Romania, positive values of SDR mean a total decline recovery, exceeding in 2014 the GDP by counties compared to 2008 (Category I - high economic resilience). The higher these values, the faster the recovery with an exceeding GDP record in 2014, compared to 2008.

On the contrary, negative values (Category II - lower economic resilience) mean an insufficient speed of the decline recovery for GDP to return in 2014 to its 2008 size. The lower the SDR, the larger decline to be recovered.

The counties of Category I, although different by the level of socio-economic development, showed a full recovery of the decline, having the higher economic resilience, as common feature.

Category II, comprising a large number of counties compared to Category I, shows a slower and insufficient speed of the decline recovery. This category also includes counties with different levels of economic and social development, such as Bucuresti, Cluj, Ilfov, Prahova which failed to match in 2014 the GDP level of 2008.

At least the following conclusions can be drawn from this analysis:

- at the macroeconomic level, the counties of Category I had the largest contribution to the recovery after the downturn caused by the crisis effects, with relatively high rates of recovery and high resilience, unlike the counties of Category II, with an insufficient speed recovery;
- in Romania, the recovery of the economic decline caused by the crisis in the 2008-2014 was slow, fragile and sluggish (a number of 23 counties having gaps still to be recovered, i.e. more than half of them), requiring special analysis in each county, related to the main factors of GDP decline, higher or lower, as well as to potential opportunities to strengthen resilience in the future;
- triggering the endogenous potential for sustainable growth in developing regions, counties and municipalities represent a factor for strengthening the economic resilience of a country *lato sensu*, of increasing resilience and recovery capacity to internal and external shocks which, in the context of globalization, can bring about speeds and intensities of contagion and spreading on the international scale.

### **3. The economic downturn effects on employment in Romania**

The effects of the global crisis and the downturn of the Romanian economy in 2009 severely impacted on employment, namely by rising unemployment, which weakened the resilience at micro and macroeconomic levels.

The data presented in Annex 2 shows that in 2009, when the first shock of the crisis on the economy occurred, an unemployment rate of 7.8% was recorded, almost double compared to 2008.

All counties without exception were affected by raising unemployment in 2009, to a greater or lesser extent, as in 12 counties this rate was over 10% (10.2% Caras-Severin; Salaj 10.3%; Harghita 10.5%; Hunedoara 10.7%; Covasna 11.1%; Ialomita 11.2%; Dolj and Galati 11.3%; Teleorman 11.5%; Alba 12.5%; Mehedinti and Vaslui 13.9%). The less resilient to rising unemployment in 2009 compared to 2008, i.e. more than 5 percentage points, were Ialomita (from 4.9% to 11.2%), Alba (from 7.1% to 12.5%), Bistrita-Nasaud (from 2.8% to 8.2%) and Prahova (from 3.8% to 8.9%).

In 2010, following the first impact of the crisis, marked by the economic recession, the unemployment rate fell to 7% throughout the economy, most counties suffering stagnation or a modest decline in the unemployment rate compared to 2009. Only in the counties Braila, Buzau and Giurgiu the unemployment continued to deteriorate.

In the period 2011-2013, even though at the level of the economy there was some recovery, the unemployment rate gradually decreasing to 5.7%, and this level remained at about 1.3 percentage points higher than in 2008. This means there is an inability of post-crisis recovery in terms of employment, during the analyzed period.

In 2013, except for two counties (Caras-Severin and Iasi, that a slightly recovered, i.e. 0.3 pp and 0.2 pp) the other counties did not return to pre-crisis levels of rate unemployment. In most of the less developed counties, the unemployment rate remained between 1 and 2 pp above that of 2008, in some counties being over 10%: Alba (10.2%); Mehedinti (10.5%); Vaslui (10.7%); Teleorman (10.8%). These counties showed a weak capacity of post-crisis recovery and, consequently, could not follow endogenous development models in which the potential of intellectual capital plays a primary role.

The employed population is one of the most important potential factors of endogenous growth at the region or county level. The analysis of employment by

counties in Romania highlights a number of issues and problems that policy makers should consider in general and the labor market and employment policies in particular.

The premise of our research focuses on the favorable effects induced by the increase of employed population on endogenous economic development. In the period 2008-2013, after the peak of the economic crisis in 2009 and 2010, the number of employed persons declined sharply in almost all counties. The data presented in Annex 3, show that, if in 2008 there were 8.75 million employed persons, in 2009 their number was down to 8.41 million persons, and in 2010 to 8.37 million persons.

**Table 4 - Index of average employed population in 2009, 2010 and 2013 compared to 2008**

County	2009/ 2008	2010/ /2008	2013/ 2008	County	2009/ 2008	2010/ 2008	2013/ 2008
Alba	94.9	93.00	96.86	Hunedoara	94.61	92.48	93.10
Arad	95.92	96.25	101.06	Ialomita	97.30	95.40	97.60
Arges	94.38	94.10	96.41	Iasi	96.79	96.59	96.62
Bacau	95.62	93.34	93.12	Marsamures	98.64	98.54	101.57
Bihor	97.64	96.52	96.66	Mehedinti	95.80	93.56	94.19
Bistrita-Nasaud	97.11	97.58	101.56	Mures	96.88	96.37	98.56
Botosani	97.59	97.12	99.53	Neamt	97.16	98.56	97.16
Brasov	95.78	95.20	100.88	Olt	95.10	95.45	96.57
Braila	96.07	93.05	92.44	Prahova	96.39	94.84	95.87
Buzau	97.20	97.54	98.21	Salaj	96.62	96.72	100.70
Caras-Severin	97.02	94.21	92.73	Satu Mare	97.02	96.22	100.20
Calarasi	95.56	98.91	97.53	Sibiu	94.29	97.29	102.49
Cluj	96.83	97.13	100.96	Suceava	96.89	98.72	96.73
Constanta	95.70	94.37	95.50	Teleorman	98.90	98.64	99.68
Covasna	95.52	92.76	95.63	Timis	94.89	95.28	100.00
Dambovita	97.28	97.53	97.48	Tulcea	95.16	92.40	95.51
Dolj	95.48	96.78	94.97	Vaslui	96.69	95.51	96.06
Galati	92.97	89.00	90.31	Valcea	97.94	97.94	97.76
Giurgiu	98.30	96.82	99.89	Vrancea	97.03	98.34	98.13
Gorj	98.64	95.05	96.41	Bucuresti	94.85	94.25	97.23
Harghita	96.72	98.81	100.15	Ifov	97.74	98.50	103.95
				<b>ROMANIA</b>	<b>96.16</b>	<b>95.7</b>	<b>97.53</b>

Source: Authors' calculations based on NIS data (TEMPO-online time series).

In just two years, the employed population diminished by nearly 400,000 persons, i.e. about 4.3% (Table 4), which shows an unfavorable trend compared

to other EU countries where the share of employed population in total active population is considerably higher.

The analysis of data in Table 4 shows that Bucharest, which holds the largest share in the country's employment, 12.8% respectively, suffered the most severe reduction in 2009 and 2010 (by about 65,000 persons cumulated in the two years, less by about 5.7%).

Other counties with low resilience to the crisis impact, which recorded significant reductions in their employed population in 2010 compared to 2008, i.e. of over 10 thousand persons, holding also an important share in both employment and in productive economic system were: Galati (22.7 thou. persons, i.e. 11%); Constanta (17.4 thou. persons, i.e. 5.6%); Timis (15.8 thou. persons, i.e. 4.7%); Prahova (15.6 thou. persons, i.e. 5.1%); Arges (15.1 thou. persons, i.e. 5.9%); Bacau (14.9 thou. persons, i.e. 6.6%); Hunedoara (14.5 thou. persons, i.e. 7.5%); Brasov (11.5 thou. persons, i.e. 4.8%); Iasi (10.1 thou. persons, i.e. 3.4%).

So, we can conclude that, in absolute terms, the employment was adversely affected in counties with a relatively high degree of development, which emphasizes again the under-utilization of human capital, directly and indirectly involved in starting and strengthening the endogenous growth models.

In the period 2011-2013, the improvement of employment was rather modest, the number of employed persons increasing slightly to 8.53 million people in 2013, but still 2.5% lower compared to 2008.

Apart from 10 counties, including some with a relatively high share in total employment (Arad, Brasov, Cluj) which recorded an increase in employed persons in 2013 compared to 2008, in other important counties (Arges, Bucharest, Constanta, Dolj, Galati, Iasi, Mures, Prahova, Suceava) the figures of employment remained below compared to the pre-crisis period, noting that the county Timis recovered the level of 2008.

A comparative analysis of the situation of gaps to be recovered i.e. of the 23 counties that had failed to return in 2014 to the GDP levels of 2008 (Table 2), as regards the employment, it seems that some of these counties, especially those of Category III (with GDP gaps of more than 10 pp), also faced high and persistent unemployment rates, and the decrease of employed population: In this situation are the following counties: Vaslui (10.5 pp GDP gap to be recovered and 10.7% unemployment rate, i.e. number of employed population by 4% lower); Mehedinti (13.6 pp GDP gap to be recovered and 10.5% unemployment rate, i.e. number of employed population by 6% less).

By economic activities (NACE Rev. 2), the shock of the crisis was felt in terms of employment mainly in manufacturing sector, more than half of the reduction in employment in 2009 compared to 2008 take place in this sector, i.e. about 200 thousand people (Annex 4).

Thus, although all counties faced a reduction in employment in the manufacturing sector, the counties characterized by more developed or systemic industrial structures, were more affected, including Bucharest (down 14.2 thousand people), Timis (13.5 thousand people), Prahova (10.5 thousand people), Galati (9.4 thousand people), Cluj (8.4 thousand people), Arges (8.2 thousand people).

Other sectors of the economy affected by the reduction in employment in 2009 compared to 2008 were the constructions (decrease by about 54 thousand people at the level of the whole sector, out of which over 15% in Bucharest-Ilfov), trade (30 thousand people, of which over 25% in Bucharest-Ilfov), hotels and restaurants (36.5 thousand people, of which over 50% in Arges, Brasov, Constanta, Dolj, Neamt, Prahova, Timis, Bucharest-Ilfov).

A sector that suffered - in an indirect way, however - because of the economic crisis, but also due to some of specific phenomena, was education, where the number of employees diminished in both 2009 and 2010 (about 42 thousand people cumulated in the two years, compared to 2008). Considering that more than half of this reduction occurred in counties with reference schools and university centers (Arges, Brasov, Bucharest, Cluj, Constanta, Mures, Suceava), we believe that the main cause of the employment decline was caused by the decrease in number of students enrolled in secondary/tertiary education.

From the viewpoint of endogenous development potential in territory, the research and development have a crucial importance, also as factor for the Romanian economy recovery during the post crisis period. Besides the low level of expenditures on this activity, from both budgetary funds and the private sector, which places Romania well below the European average, the average number of employees in R&D activities suffered a severe decline following the impact of the crisis in the economy, diminishing by about 4,500 people in 2010 compared to 2008, i.e. by more than 10%.

In Table 5 the classification of counties by number of employees in R&D activities is presented. It results that, although most counties recorded a decrease in the number of employees following the impact of the crisis, the configuration of the four groups according to their R&D potential suffered no major changes in 2010 compared to 2008 as concerns the number of counties in each group, several changes occurring only in their ranking, because of some counties moving to other groups.

**Table 5 - Classification of counties by the number of employees in R&D activities in 2008, 2010 and 2013**

R&D employees Groups	Number of counties	Counties
<b>Year 2008 Total employees in R&amp;D activities: 43, 502 persons</b>		
Up to 100 employees (weak potential)	14	Salaj, Mehedinti, Ialomita, Giurgiu, Vrancea, Olt, Teleorman, Harghita, Buzau, Covasna, Satu Mare, Botosani, Braila, Vaslui <b>(Subtotal: 451 employees – 1% of Total)</b>
101-400 employees (modest potential)	11	Maramures, Caras-Severin, Neamt, Bistrita-Nasaud, Valcea, Tulcea, Gorj, Alba, Calarasi, Bacau, Dambovita <b>(Subtotal: 2624 employees – 6% of Total)</b>
401-1000 employees (medium potential)	9	Bihor, Hunedoara, Mures, Suceava, Sibiu, Arad, Constanta, Galati, Timis <b>(Subtotal: 5559 employees – 12,8% of Total)</b>
Over 1000 employees (significant potential)	8	Prahova, Brasov, Dolj, Ilfov, Arges, Iasi, Cluj, Bucuresti Municipality <b>(Subtotal: 34868 employees – 80,2% of Total)</b>
<b>Year 2010 Total employees in R&amp;D activities: 39,065 persons</b>		
Up to 100 employees (weak potential)	14	Giurgiu, Mehedinti, Salaj, Ialomita, Olt, Vrancea, Teleorman, Satu Mare, Harghita, Braila, Botosani, Covasna, Buzau, Vaslui <b>(Subtotal: 361 employees – 0,9% of Total)</b>
101-400 employees (modest potential)	12	Caras-Severin, Tulcea, Maramures, Neamt, Gorj, Bistrita-Nasaud, Valcea, Alba, Bacau, Calarasi, Dambovita, Hunedoara <b>(Subtotal: 2658 employees – 6,8% of Total)</b>
401-1000 employees (medium potential)	8	Mures, Suceava, Prahova, Bihor, Sibiu, Constanta, Arad, Galati <b>(Subtotal: 4747 employees – 12,2% of Total)</b>
Over 1000 employees (significant potential)	8	Brasov, Dolj, Arges, Ilfov, Iasi, Timis, Cluj, mun. Bucuresti <b>(Subtotal: 31299 employees – 80,1% of Total)</b>
<b>Year 2013 Total employees in R&amp;D activities: 43,375 persons</b>		
Up to 100 employees (weak potential)	17	Mehedinti, Ialomita, Olt, Botosani, Giurgiu, Harghita, Vrancea, Teleorman, Maramures, Salaj, Covasna, Buzau, Vaslui, Bihor, Braila, Gorj, Satu Mare <b>(Subtotal: 663 employees – 1,5% of Total)</b>
101-400 employees (modest potential)	11	Caras-Severin, Neamt, Tulcea, Valcea, Bistrita-Nasaud, Alba, Bacau, Dambovita, Mures, Calarasi, Galati <b>(Subtotal: 2881 employees – 6,6% of Total)</b>
401-1000 employees (medium potential)	6	Sibiu, Prahova, Suceava, Hunedoara, Arad, Constanta <b>(Subtotal: 3614 employees – 8,3% of Total)</b>
Over 1000 employees (significant potential)	8	Brasov, Dolj, Timis, Cluj, Iasi, Ilfov, Arges, mun. Bucuresti <b>(Subtotal: 36217 employees – 83,5% of Total)</b>

Source: Authors' calculations based on NIS data.



Major territorial discrepancies showed by this endogenous development factor are revealed in , the counties with up to 100 employees working in R&D activities (weak potential). In 14 counties, it has been recorded a decrease in the number of employees from 451 people to 261 people, representing only about 1% of Romania's R&D employees. In 8 counties with over 1000 employees in R&D activities (significant potential) holding more than 80% of the total employees in this sector, is concentrated the most relevant part of R&D labour force in Romania. As a rule, these counties are the most important academic centers of our country.

As a result of reducing the number of employees in R&D activities from 462 persons working in 2008 to 390 persons in 2010, the Hunedoara county, considered as having a modest R&D potential, went into the group with 101-400 employees.

The Prahova county, which witnessed a drastic decrease in the number of employees in R&D activities from 1158 people in 2008 to 533 in 2010 went from the group with over 1000 employees (significant potential) to the group 401-1000 employees (medium potential). Timis county, which recorded an increase from 915 persons to 2805 persons in the number of R&D employees in the same period, advanced in the group with over 1000 employees, improving its scientific research potential.

The Bucharest Municipality, which concentrated in 2008 about 43% of the total number of employees in R&D activities, had the most drastic reduction in 2010 as the impact of the crisis, i.e. by 4363 persons, which led to the decrease of its share in total at about 37%.

In the post-crisis period, at the level of Romania's economy, the average number of R&D employees increased to 42.3 thou. persons in 2011, to 42.7 thou. persons in 2012 and to 43.4 thou. persons in 2013.

This partial recovery of the situation was asymmetric, the severe regional disparities maintaining and even worsening if it is taken into consideration that in 2013 the number of counties with weak endogenous potential (less than 100 employees in R&D activities) increased from 14 to 17 by the entry into this group of counties of Bihor, Gorj and Maramures, and that two other counties (Mures and Galati) went from medium potential group (401-1000 employees) to the modest potential group (101-400 employees).

The endogenous growth potential of a country is represented by several indicators such as the employed population and the employees in R&D activities.

As regards the share of employees in R&D activities by counties, expressed as a percentage of total employment, we believe that such an indicator provides more relevant information in terms of both the intensity of territorial endogenous growth and the development of economic and financial policies and mechanisms appropriate to the endogenous regional development requirements.

The analysis of the indicator for the years 2008-2013 considers the possibility to deduce some trends in its developments, including in the crisis peak years of 2009 and 2010.

Based on data from Annex 5, we can draw some relevant aspects regarding the differentiation of counties by the labor force of the R&D sector, considered a core in order to promote the endogenous development.

A first remark on 2013 data focuses on the extremely low percentage of R&D employees in the total employment, i.e. below 1% in all counties except for the Municipality of Bucuresti (1.6%), Ilfov (1.9%), Arges (1.4%) and Iasi (1.1%).

There are counties where the R&D personnel is practically non-existent. These counties, *ipso facto*, only from now have to design a vision and to set targets and action plans meant to implement sustainable endogenous development strategies at county and local levels, valuing the human, natural, financial and administrative potential; among them an important role is played by centers and diffusion poles of technological progress and of increasing total productivity factor.

The economic crisis has shown its impact on reducing the size of the indicator, particularly in 2009, after which a slow improvement was recorded, many counties recovered the decline from previous years.

We notice, however, significant reductions in the percentage share of R&D employees in the total employment in 2013 compared to 2008 in 14 counties, including: Cluj (0.787% against 0.998%); Galati (0.436% against 0.208%); Gorj (0.063% against 0.170%); Prahova (0.383% against 0.164%); Sibiu (0.220% against 0.299%).

The Municipality of Bucuresti has also recorded a decrease in the share of R&D employees, which, even if small (1.635% against 1.686%), reflected the deterioration of the indicator of the center with the most important endogenous development potential.

The decrease in the share of R&D employees in the local employment without being recovered during the analyzed period in the abovementioned counties was

cause, among others, by the de-industrialization, which meant the dissolution of many centers and research institutes.

The territorial disparities in terms of research and development endogenous potential are more obvious when examining the classification of counties by the share of R&D employees in total employment (Table 6).

It was found that in 2013, the 15 counties where this ratio was below 0.05% get only 478 employees, which, compared with the number of active population of 2,122,200 persons in these counties, represent only 0.0225%.

**Table 6 - Classification of counties by share of R&D employees in total active population in 2013**

Share Ranges	Number of counties	Counties	R&D Employees (persons)	Active population (persons)	R&D employees/employment (%)
<b>below 0.05%</b>	15	Bihor, Botosani, Buzau, Braila, Covasna, Giurgiu, Harghita, Ialomita, Maramures, Mehedinti, Olt, Salaj, Teleorman, Vaslui, Vrancea	<b>478</b>	<b>2,122,200</b>	<b>0.0225</b>
<b>0.06% - 0.5%</b>	19	Alba; Arad; Bacau; Bistrita-Nasaud; Caras-Severin; Calarasi, Constanta, Dambovita, Galati, Gorj, Hunedoara Mures, Neamt, Prahova, Satu Mare, Sibiu, Suceava, Tulcea, Valcea	<b>6,680</b>	<b>3,442,300</b>	<b>0.194</b>
<b>over 0.5%</b>	8	Arges, Brasov, Cluj, Dolj, Iasi, Timis, Bucuresti, Ilfov	<b>36,217</b>	<b>2,966,100</b>	<b>1.221</b>
<b>TOTAL</b>			<b>43,375</b>	<b>8,530,600</b>	<b>0.508</b>

Source: Authors' calculations based on NIS data (TEMPO-online time series).

These counties recorded in 2013 the lowest share of employees in R&D activities in the total employment, as follows: Bihor (0.028%); Botosani (0.003%); Buzau (0.039%); Braila (0.064%); Covasna (0.046%); Giurgiu (0.008%); Harghita (0.011%); Ialomita (0.00); Maramures (0.016%); Mehedinti (0.00%); Olt (0.001%); Salaj (0.038%); Teleorman (0.017%); Vaslui (0.05%); Vrancea (0.018%).

The counties in the first category, in terms of R&D activity, can be regarded as "disadvantaged areas" that requires measures to promote specific endogenous

development adequate to their profile, mainly agriculture. It is worth mentioning that a number of 12 of these 15 counties belong also to the group with up to 100 R&D employees (weak endogenous potential).

The second group includes a total of 19 counties where the percentage of R&D employees in total employed labour force is between 0.06% and 0.5%, the total number of 6680 employees of the group representing 0.2% of the employed population in these counties, below the national average (0.508%).

The counties belonging to this group have an average share ranging between 0.06% and 0.5%, including: Arad (0.358%); Alba (0.170%); Bacau (0.154%); Calarasi (0.355%), Caras-Severin (0.108%); Constanta (0.288%), Bistrita-Nasaud (0.178%); Dambovița (0.165%), Hunedoara (0.326%), Galati (0.208%); Gorj (0.063%); Mures (0.147%); Neamt (0.079%); Prahova (0.164%); Satu Mare (0.066%); Sibiu (0.220%); Suceava (0.233%); Tulcea (0.210%); Valcea (0.125%).

In the counties from this group a series of research activities have been started within higher education entities and certain companies or local government units.

Compared to the first group of counties, one can assert that the counties belonging to this group have better chances of recovery and of endogenous growth potential in the medium and long terms.

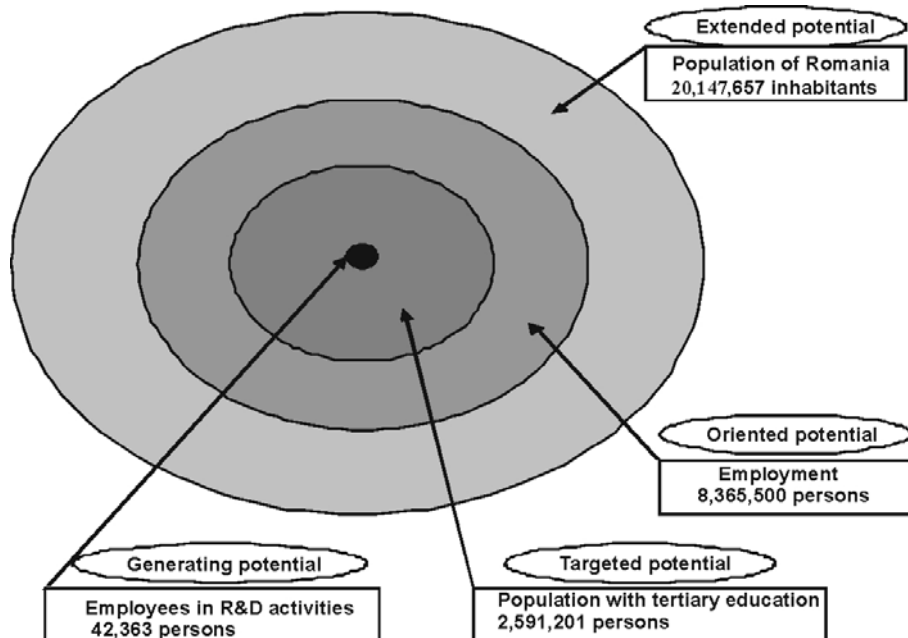
The third group refers to counties with a more than 0.5% share of R&D such as: Brasov (0.664%); Cluj (0.787%); Arges (1.384%); Dolj (0.671%); Iasi (1.134%); Timis (0.719%); Bucuresti (1.635%) and Ilfov (1.986%).

We mention that the Municipality of Bucuresti and Ilfov county are exceeding by far the share of other counties, contributing substantially to the national average of 0.508%.

The third group includes the largest cities of the country, with traditional public and private research centers and having the largest endogenous development opportunities and potential. These counties are able to generate positive externalities for endogenous development and spillover effects for counties with relatively low potential and endogenous factors.

The 8 counties with a percentage share of in R&D personnel in total employment of over 0.5% (36,217 persons representing 1.221% of the total employment in these counties) are contributing decisively to sizing the national average.

Figure 3



As shown in Figure 3, in 2011, compared to the Romania's total population (extended potential of endogenous development), the employment (oriented potential of endogenous development) was 2.5 times smaller, the population with tertiary education (targeted potential of endogenous development) 8 times lower and the employees in R&D activities (generating potential of endogenous development) of about 500 times less.

The endogenous development of all counties can be boosted by promoting knowledge-based re-industrialization strategies and policies for smart specialization, according to the industrial profile and vocation at the county and local levels.

#### 4. Concluding remarks

The global economic and financial crisis has had a negative impact on the Romanian economy, especially as concerns the severe GDP decline at macroeconomic and at county levels, and the longer duration of recovering the economic downturn.

Despite the EUR 20 bn financial assistance package from IMF-EU in 2009, the austerity measures imposed by the Romanian government in 2010 (wage cuts in the public sector, pensions cuts, VAT rate increase), the lack of appropriate incentives (of monetary policy, in particular, by the diminishing the NBR reference interest rate, which could entail the reduction in borrowing costs) have worsened the effects of the crisis, including at the local level, hindering investments as driver of economic recovery.

The main conclusions from our analysis focus on the fact that the decline generated by the crisis effects since 2008 was recovered only in 2014 at the national economy level, i.e. after 6 years, which shows a low recovery and resilience capacity of Romania. In other words, Romania currently managed to recover the GDP level achieved in 2008, after a period of economic decline for two years, followed by a recovery period of 4 years, which basically means a longer recovery period compared to that of other countries.

The research highlights the differentiated recovery duration of the economic decline in 42 counties, a number of 23 counties, the Municipality of Bucharest included failing to achieve by 2014 the GDP level recorded in 2008. Thus, after 2014, a number of 11 counties have to recover GDP gaps between 0-5 pp, other 6 counties within 5-10 pp and 6 counties over 10 pp.

Among counties with GDP gaps to be recovered in the following years, there are some counties of systemic importance such as the Municipality of Bucharest, which have to recover more than 4.2 percentage points, Prahova - 5.7 pp, Cluj - 14.8 pp.

In terms of employment, the recovery ability of Romania proved even weaker than in the GDP case, out from 600 thousand jobs lost in 2009 and 2010, only half of them having been recovered by 2014. The study found that many of counties that have not recovered the GDP decline up to 2014, in particular those of Category III (with GDP gaps of more than 10 pp) also faced with high and persistent unemployment rates.

One of the factors to be considered for catching the calculated gaps is related to the increase of total factor productivity in the implementation of endogenous regional growth strategies, based on internal economic and natural potential, efficiently combined with external factors of economic growth.

Enhancing regional economic resiliencies is an extremely complex task which depends on a multitude of economic, social, technological factors, both external and internal. Among these factors, the local capacity to effectively absorb R&D results from abroad or inside the country under the circumstances of rapid

changes of scientific and technological activities. The external economic openness regions, their well defined specialization strategies, environmental investments represent important factors supporting the resilience and re-launching sustainable regional economic development.

## Referencies

1. Antonescu D. (2013), *The Regional Development Policy of Romania in the Post-Accession Period*, Working Papers of the National Institute of Economic Research, Bucharest.
2. Atkins, J., Mazzi, S., Easter, C. A. (2000), *Commonwealth Vulnerability Index for Developing Countries: The Position of Small States*, London: Commonwealth Secretariat
3. Bernanke, B., S. (2013), *The Economic Recovery and Economic Policy*, The Economic Club of New York, November 20.
4. Blanchard O. J., Katz L. F. (1992), *Regional Evolutions*, Brookings Institution Press.
5. Capello R., Nijkamp P. (2009), *Introduction: regional growth and development theories in the twenty-first century – recent theoretical advances and future challenges*, Elgar online.
6. Capello R., Perucca G. (2013), *Do Eastern European Regions Move Towards an Endogenous Growth Pattern? A Diachronic Perspective of Regional Success Factors*, GRINCOH, February 28.
7. IMF (2014), *World Economic Outlook. Legacy, Clouds, Uncertainties*, Washington, October.
8. Kenneth, R. (2011), *The Second Great Contraction*, Project Syndicate, August 9.
9. Martin, R., F., Munyan, T., Wilson, B., A. (2014), *Potential Output and Recessions: Are We Fooling Ourselves?*, IFDP Notes, November 12.
10. National Commission for Prognosis (2014, 2013), *Proiectia principalilor indicatori economico-sociali in profil teritorial (The projection of main economic and social indicators in territory)*, Bucharest.
11. National Institute of Statistics – TEMPO Online database, Time series, Bucharest.
12. Papell D. H., Prodan R (2011), *The Statistical Behavior of GDP after Financial Crises and Severe Recessions*, University of Houston, October 11.
13. Pendall R., Foster K, Cowell M. (2009), *Resilience and regions: building understanding of the metaphor*, Oxford University Press.
14. Reinhart, C., Rogoff, K. (2009), *This Time is Different: Eight Centuries of Financial Folly*, Princeton University Press.
15. Sandu S. (2014), *Market of R&D Results in Romania*, Procedia Economics and Finance, Volume 8, Pages 649–657.
16. Zaman, Gh., Vasile, V. (2014), *Conceptual framework of economic resilience and vulnerability at national and regional levels*, Romanian Journal of Economics, nr.2/2014, p. 5-18.
17. Zaman, Gh., Georgescu, G. (2009), *The Impact of Global Crisis on Romania's Economic Development*, in *Annales Universitatis Apulensis Series Oeconomica*, 11(2); (2009), *Effets globaux de la crise financière. Nouveaux défis pour le développement durable en Roumanie*, MPRA Paper 53181, University Library of Munich, Germany.
18. \*\*\* *Territorial Dynamics in Europe Economic Crisis and the Resilience of Regions*, Territorial Observation No. 12, September 2014, ESPON 2013 Programme, Luxembourg.

### Annex 1 - The GDP annual average growth during the period 2009-2014, by counties

County	GDP growth rate (% compared to previous year)							Average 2008-2014 (%)
	2008	2009	2010	2011	2012	2013	2014*	
Alba	100.0	92.5	104.6	104.0	99.7	105.3	103.9	1.56
Arad	100.0	93.3	101.4	101.2	104.0	103.9	104.3	1.28
Arges	100.0	100.5	89.5	103.9	98.6	108.4	101.3	0.2
Bacau	100.0	94.5	97.4	103.7	102.1	99.2	101.2	-0.36
Bihor	100.0	91.2	99.0	101.7	102.5	102.6	102.7	-0.14
Bistrita-Nasaud	100.0	97.2	88.6	101.6	101.1	104.7	101.7	-0.99
Botosani	100.0	95.5	93.5	103.4	99.3	104.8	102.8	-0.21
Brasov	100.0	98.6	102.1	104.4	101.7	104.2	103.5	2.40
Braila	100.0	98.3	85.7	105.0	89.9	104.1	101.2	-2.91
Buzau	100.0	90.3	101.4	107.9	95.9	101.4	101.3	-0.45
Caras-Severin	100.0	100.6	98.3	103.0	101.2	105.0	102.6	1.76
Calarasi	100.0	87.8	119.6	102.9	95.4	105.8	101.7	1.74
Cluj	100.0	95.6	98.5	94.6	90.4	103.0	102.7	-2.64
Constanta	100.0	97.5	102.5	103.0	100.9	102.5	104.4	1.78
Covasna	100.0	95.7	90.1	101.8	94.9	102.0	102.9	-2.21
Dambovita	100.0	94.3	105.9	103.4	96.9	100.4	102.9	0.55
Dolj	100.0	95.6	95.5	101.0	109.5	122.2	105.1	4.43
Galati	100.0	88.6	107.1	101.6	97.6	103.4	101.8	-0.16
Giurgiu	100.0	97.1	127.7	102.2	98.7	102.4	102.1	4.57
Gorj	100.0	104.7	105.0	103.7	99.9	93.2	102.0	1.33
Harghita	100.0	95.5	92.7	103.9	99.9	100.4	99.5	-1.42
Hunedoara	100.0	92.2	95.6	102.5	100.7	104.2	102.6	-0.46
Ialomita	100.0	93.6	100.2	103.9	99.0	103.7	100.7	0.12
Iasi	100.0	94.3	103.0	105.7	101.7	101.6	102.6	1.42
Maramures	100.0	96.9	97.6	102.5	102.2	105.4	102.8	1.19
Mehedinti	100.0	95.2	93.0	98.0	98.4	102.2	99.0	-2.41
Mures	100.0	92.3	94.7	104.6	103.0	104.6	103.4	0.31
Neamt	100.0	93.3	91.9	103.9	99.1	102.4	102.4	-1.28
Olt	100.0	87.9	110.0	105.6	97.9	103.3	101.8	0.84
Prahova	100.0	97.6	85.8	102.5	100.4	104.4	104.8	-0.98
Salaj	100.0	95.4	96.2	103.5	97.7	103.7	102.4	-0.24
Satu Mare	100.0	94.0	94.7	102.3	99.8	105.3	102.0	-0.40
Sibiu	100.0	97.1	95.8	101.0	102.7	108.4	102.1	1.10
Suceava	100.0	98.9	93.6	103.2	103.2	107.0	102.9	1.38
Teleorman	100.0	93.9	93.2	102.5	96.3	104.2	101.7	-1.46
Timis	100.0	92.7	105.7	102.9	101.3	106.8	102.7	1.91
Tulcea	100.0	91.6	106.2	105.0	93.2	103.6	100.8	-0.10
Vaslui	100.0	91.4	94.2	102.6	98.7	100.7	101.9	-1.84
Valcea	100.0	90.2	94.3	104.7	93.7	98.8	101.0	-3.01
Vrancea	100.0	93.1	101.1	102.7	98.5	103.0	101.3	-0.11
Bucuresti	100.0	88.3	100.8	100.3	103.3	101.4	102.4	-0.72
Ifov	100.0	94.3	94.2	102.0	100.3	101.4	102.6	-0.93
<b>ROMANIA</b>	<b>100.0</b>	<b>93.4</b>	<b>98.9</b>	<b>102.2</b>	<b>100.6</b>	<b>103.5</b>	<b>102.6</b>	<b>0.14</b>

\*Forecast

Source: Calculations based on NIS and NCP data.



**Annex 2 - The unemployment rate by counties during the period  
2008 – 2013 (%)**

County	2008	2009	2010	2011	2012	2013
Alba	7.1	12.5	10.0	7.7	8.4	10.2
Arad	3.1	6.8	5.2	3.5	3.6	3.2
Arges	4.9	9.5	7.6	5.7	6.1	7.0
Bacau	5.3	9.0	7.8	6.2	6.4	7.2
Bihor	3.0	5.8	5.9	4.2	4.2	3.7
Bistrita-Nasaud	2.7	8.2	6.4	4.9	4.8	4.9
Botosani	3.6	7.2	6.4	4.0	4.4	5.3
Brasov	4.3	8.7	7.2	5.1	4.9	4.7
Braila	4.4	8.0	8.7	5.8	6.5	7.0
Buzau	5.7	9.4	9.7	8.0	7.9	8.6
Caras-Severin	6.0	10.2	9.0	5.6	5.5	5.7
Calarasi	5.1	9.2	8.8	6.3	7.2	8.2
Cluj	2.9	6.3	4.9	3.8	3.8	3.5
Constanța	3.0	6.4	5.8	4.3	4.5	4.4
Covasna	7.2	11.1	10.0	8.6	7.6	7.4
Dambovita	5.6	8.5	8.5	6.5	7.5	8.1
Dolj	8.1	11.3	9.8	8.9	9.4	9.7
Galati	6.6	11.3	10.4	7.9	8.9	9.2
Giurgiu	4.5	7.2	8.4	5.7	5.9	6.2
Gorj	7.3	10.7	10.1	7.8	7.7	8.2
Harghita	6.5	10.5	8.8	6.5	7.3	7.0
Hunedoara	6.7	10.7	8.5	6.0	6.6	7.5
Ialomita	4.9	11.2	9.9	7.6	7.7	7.5
Iasi	5.4	7.4	7.0	5.4	5.1	5.2
Maramures	3.7	6.4	6.0	4.1	4.1	3.9
Mehedinti	9.3	13.9	10.5	9.7	9.5	10.5
Mures	4.7	8.0	8.0	6.0	6.0	5.5
Neamt	4.1	7.9	7.7	5.2	5.4	6.2
Olt	5.3	8.9	8.2	6.9	7.7	8.2
Prahova	3.9	8.9	8.6	5.7	5.6	5.8
Salaj	5.5	10.3	8.4	6.5	6.2	6.2
Satu Mare	3.0	6.5	6.1	4.6	4.8	4.6
Sibiu	3.1	8.3	5.8	4.3	4.5	4.8
Suceava	4.3	7.9	7.3	4.9	5.5	6.5
Teleorman	8.1	11.5	10.9	9.1	9.6	10.8
Timis	1.6	4.5	3.7	1.9	2.0	1.9
Tulcea	4.4	8.9	8.1	5.8	5.9	5.9
Vaslui	10.2	13.9	11.8	9.8	10.1	10.7
Valcea	4.7	7.9	7.7	5.2	6.1	6.8
Vrancea	4.4	7.4	7.4	5.5	5.5	5.9
Bucuresti	1.6	2.4	2.3	2.0	2.0	2.0
Ilfov	1.3	2.4	2.7	1.6	1.8	1.9
<b>ROMANIA</b>	<b>4.4</b>	<b>7.8</b>	<b>7.0</b>	<b>5.2</b>	<b>5.4</b>	<b>5.7</b>

Source: NIS data (TEMPO-online time series).

### Annex 3 - The employment by counties during the period 2008-2013

- thousand persons -

County	2008	2009	2010	2011	2012	2013
Alba	168.6	160.0	156.8	158.1	163.4	163.3
Arad	208.2	199.7	200.4	201.3	206.2	210.4
Arges	256	241.6	240.9	241.7	249.4	246.8
Bacau	223.7	213.9	208.8	208.3	213.3	208.3
Bihor	275.6	269.1	266.0	263.0	268.3	266.4
Bistrita-Nasaud	128.2	124.5	125.1	127.0	131.7	130.2
Botosani	149.3	145.7	145.0	146.6	150.8	148.6
Brasov	239.6	229.5	228.1	229.2	237.6	241.7
Braila	132.3	127.1	123.1	123.1	123.8	122.3
Buzau	178.6	173.6	174.2	173.4	176.4	175.4
Caraş-Severin	121.0	117.4	114.0	112.6	115.1	112.2
Calarasi	101.3	96.8	100.2	99.2	100.9	98.8
Cluj	334.6	324.0	325.0	326.3	332.8	337.8
Constanţa	309.0	295.7	291.6	287.3	295.0	295.1
Covasna	87.0	83.1	80.7	81.9	84.4	83.2
Dambovita	198.5	193.1	193.6	193.3	196.9	193.5
Dolj	276.6	264.1	267.7	261.1	266.2	262.7
Galati	206.3	191.8	183.6	181.9	185.9	186.3
Giurgiu	88.0	86.5	85.2	87.5	89.8	87.9
Gorj	139.4	137.5	132.5	133.3	135.3	134.4
Harghita	134.0	129.6	132.4	132.0	134.9	134.2
Hunedoara	192.8	182.4	178.3	176.1	180.9	179.5
Ialomita	100.1	97.4	95.5	96.0	99.0	97.7
Iaşi	295.8	286.3	285.7	280.0	287.1	285.8
Maramures	198.0	195.3	195.1	196.6	202.1	201.1
Mehedinti	111.8	107.1	104.6	105.4	108.5	105.3
Mures	236.8	229.4	228.2	229.0	235.6	233.4
Neamt	193.8	188.3	191.0	186.5	192.8	188.3
Olt	169.3	161.0	161.6	162.6	167.4	163.5
Prahova	302.3	291.4	286.7	284.2	288.3	289.8
Salaj	100.6	97.2	97.3	98.2	101.9	101.3
Satu Mare	150.9	146.4	145.2	145.6	150.4	151.2
Sibiu	180.5	170.2	175.6	176.6	184.8	185.0
Suceava	241.5	234.0	238.4	232.7	237.9	233.6
Teleorman	154.8	153.1	152.7	152.6	158.3	154.3
Timis	334.4	317.3	318.6	325.1	334.2	334.4
Tulcea	86.8	82.6	80.2	80.0	84.4	82.9
Vaslui	144.8	140.0	138.3	138.7	142.8	139.1
Valcea	169.9	166.4	166.4	166.5	170.6	166.1
Vrancea	144.6	140.3	142.2	140.5	145.5	141.9
Bucuresti	1122.1	1064.3	1057.6	1062.0	1070.6	1091
Ifov	159.6	156.0	157.2	162.5	168.4	165.9
<b>ROMANIA</b>	<b>8747</b>	<b>8410.7</b>	<b>8371.3</b>	<b>8365.5</b>	<b>8569.6</b>	<b>8530.6</b>

Source: NIS data (TEMPO-online time series).

**Annex 4: The share held by the manufacturing sector in total employment by counties, during the period 2008 – 2011 (%)**

County	2008	2009	2010	2011
Alba	29.54	27.38	26.91	28.27
Arad	31.99	30.70	31.29	32.09
Arges	30.27	28.15	28.14	28.63
Bacau	22.53	20.48	19.35	19.68
Bihor	25.40	24.71	24.70	25.32
Bistrita-Nasaud	25.27	22.89	23.02	23.62
Botosani	15.74	15.17	14.83	14.94
Brasov	27.13	25.53	25.52	26.35
Braila	24.94	22.82	21.93	22.42
Buzau	22.51	20.45	20.55	20.76
Caras-Severin	23.22	23.00	21.93	21.67
Calarasi	18.07	15.81	15.57	16.23
Cluj	22.71	20.93	20.58	20.96
Constanța	19.51	18.57	17.90	17.86
Covasna	31.03	27.80	28.38	27.96
Dambovita	25.74	24.70	24.54	24.21
Dolj	18.00	15.94	15.20	15.59
Galati	22.98	19.71	18.52	18.14
Giurgiu	10.91	10.29	9.15	9.03
Gorj	27.76	26.62	25.36	25.73
Harghita	27.46	25.39	24.62	24.70
Hunedoara	30.91	29.39	29.50	29.47
Ialomita	15.98	15.20	15.92	15.63
Iasi	18.36	16.91	16.21	16.46
Maramures	24.09	23.50	23.68	23.60
Mehedinti	19.23	16.06	15.97	15.28
Mures	25.84	24.24	24.45	24.50
Neamt	19.14	17.37	16.34	16.84
Olt	21.50	18.88	17.95	18.82
Prahova	30.20	27.63	26.86	27.20
Salaj	25.75	23.66	23.43	23.42
Satu Mare	25.65	23.84	24.04	24.18
Sibiu	32.80	30.79	30.92	31.48
Suceava	16.48	15.38	14.77	15.90
Teleorman	15.89	14.37	14.67	14.68
Timis	28.11	25.31	26.52	28.05
Tulcea	22.12	20.46	19.33	18.88
Vaslui	18.92	16.64	16.78	16.51
Valcea	22.84	21.88	21.51	21.62
Vrancea	20.19	18.46	17.86	18.15
Bucuresti	14.92	14.49	13.57	13.42
Ilfov	25.50	24.36	23.47	22.22
<b>ROMANIA</b>	<b>22.65</b>	<b>21.09</b>	<b>20.71</b>	<b>20.96</b>

Source: NIS data (TEMPO-online time series).

**Annex 5 - The share of R&D in total employment by counties, during the period 2008-2013**

County	2008	2009	2010	2011	2012	2013
Alba	0.158	0.153	0.155	0.175	0.153	0.170
Arad	0.317	0.400	0.366	0.357	0.272	0.358
Arges	1.006	1.003	0.968	0.482	0.854	1.384
Bacau	0.152	0.201	0.140	0.190	0.162	0.154
Bihor	0.159	0.197	0.215	0.033	...	0.028
Bistrita-Nasaud	0.131	0.160	0.145	0.088	0.098	0.178
Botosani	0.039	0.021	0.028	0.008	0.007	0.003
Brasov	0.645	0.855	0.789	0.986	0.768	0.664
Braila	0.063	0.057	0.024	0.011	0.158	0.064
Buzau	0.018	0.022	0.036	0.042	0.033	0.039
Caras-Severin	0.122	0.123	0.111	0.113	0.100	0.108
Calarasi	0.322	0.312	0.303	0.423	0.337	0.355
Cluj	0.998	1.015	0.953	1.040	0.938	0.787
Constanta	0.217	0.249	0.227	0.274	0.270	0.288
Covasna	0.043	0.039	0.052	0.057	0.065	0.046
Dambovita	0.198	0.187	0.178	0.189	0.179	0.165
Dolj	0.667	0.705	0.722	0.723	0.742	0.671
Galati	0.436	0.414	0.442	0.252	0.209	0.208
Giurgiu	0.007	0.001	...	...	0.061	0.008
Gorj	0.170	0.150	0.125	0.121	0.051	0.063
Harghita	0.022	0.022	0.021	0.014	0.033	0.011
Hunedoara	0.240	0.230	0.219	0.321	0.277	0.326
Ialomita	0.003	0.011	0.008	0.003	...	...
Iasi	1.028	1.013	0.839	0.919	0.997	1.134
Maramures	0.074	0.070	0.071	0.077	0.061	0.016
Mehedinti	0.002	0.002	...	...	...	...
Mures	0.203	0.217	0.180	0.164	0.153	0.147
Neamt	0.078	0.095	0.075	0.051	0.076	0.079
Olt	0.011	0.008	0.010	0.012	0.016	0.001
Prahova	0.383	0.191	0.186	0.097	0.116	0.164
Salaj	...	0.002	0.002	0.045	0.040	0.038
Satu Mare	0.036	0.020	0.018	0.016	0.057	0.066
Sibiu	0.299	0.569	0.337	0.311	0.238	0.220
Suceava	0.203	0.190	0.182	0.183	0.181	0.233
Teleorman	0.014	0.013	0.013	0.015	0.015	0.017
Timis	0.274	0.532	0.880	0.545	0.681	0.719
Tulcea	0.260	0.254	0.158	0.220	0.207	0.210
Vaslui	0.062	0.042	0.049	0.043	0.055	0.050
Valcea	0.129	0.125	0.120	0.128	0.004	0.125
Vrancea	0.011	0.011	0.013	0.006	0.029	0.018
Bucuresti	1.686	1.613	1.376	1.848	1.712	1.635
Ilfov	1.535	1.544	1.513	1.608	2.124	1.986
<b>ROMANIA</b>	<b>0.497</b>	<b>0.504</b>	<b>0.467</b>	<b>0.506</b>	<b>0.498</b>	<b>0.508</b>

Source: calculations based on NIS data (TEMPO-online time series).