Evolution of Regional Disparities in Romania – A Shift-Share Analysis[1]

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Abstract

The paper aims to assess the evolution of the development disparities (in what regards value-added and employment, for the main sectors of economy) in the regions and counties of Romania. Using classic shift-share analysis tools, we investigate the extent to which the existing interregional and, especially, intra-regional and inter-county inequalities can be attributed to different factors, such as industry mix, and regional specific factors. The results reveal a diverse milieu and offer useful insights both for general and specifically targeted policies in the area of regional development.

Introduction

The shift-share analysis is a methodology frequently used to obtain insights into the determinants of regional growth processes, which can address many issues, such as output growth, employment growth and productivity growth[2], since the levels of Gross Value Added (GVA), employment and labor productivity and their changes by industry and region are key elements to analyze how a region is performing[3]. In its "classical" form, such analysis proposes to "split" the evolution of a certain growth determinant in a given region according to three components: i) a *national* component, which expresses how much a variable in each industry and region would have changed had they undergone the same global average rate of growth nationwide (or EU, in case of a broader analysis), ii) a *share* component (also called *industry-mix*), which expresses what the variable situation would have been had each of the sectors known the same rate of growth as it had on a national basis, minus the precedent global component; and iii) a *shift* component (also called *regional-shift* or *competitive effect*), resulting from the difference

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[2] Esteban Fernández Vázquez, Bart Los and Carmen Ramos Carvajal, Path Based Shift-Share Analysis: Using Additional Information in Decomposing Regional Economic Changes, University of Oviedo, Department of Applied Economics, Spain and University of Groningen, Growth and Development Center and SOM Research School, The Netherlands.

[3] José Luis Iparraguirre D'Elia, Labour Productivity, *Gross Value Added and Employment by Industry in Northern Ireland. A Structural and Shift-Share Analysis*, Economic Research Institute of Northern Ireland ERINI Monograph 6, December 2005.

between the evolution actually observed and the evolutions calculated thereby in proportion of national evolutions, capturing those dynamic elements which are unique to each region. This component may be interpreted as the global result of a balance between the 'attractiveness' and the 'repulsiveness' of a region for the different sectors of activity[4]. Employing the tools of classical shift-share analysis, the paper attempts to assess the development disparities (in what regards value-added and employment, for the main sectors of economy) in the regions and counties of Romania, attempting to answer questions such as[5]:

− How much of the change in GVA and employment in the main sectors in a region over a given period was due to changes in the Romanian economy as a whole over that same period?

− How much of the change in GVA and employment in the main sectors in a region over a given period was due to changes in GVA and employment, respectively, in that sector across Romania over that same period?

− How much of the change in GV and employment in the main sectors over a given period in the Romanian regions was due to changes primarily in a region's economy as a whole over that same period?

Due to data availability, the shift-share analysis of employment will encompass the years 2000 to 2008, while those of GVA will cover the period 2002-2008[6]. The computations have been done for the Romanian NUTS-1, NUTS-2 and NUTS-3 regions[7].

1. The Shift-Share Method

The shift-share analysis (introduced by Dunn, in 1960) was a much used tool in regional analysis, due to its simplicity in capturing the underlining changes in the variables under consideration. It requires only relatively modest amounts of data that are generally accessible, making the resulting analysis fast and reasonably accurate[8].

However, despite its popularity, the shift-share analysis has also attracted severe criticism for many different reasons, such as the absence of theoretical content; sensitivity to the level of

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[4] Pierre-Yves Leo and Jean Philippe, Business Services, the New Engine of French Regional Growth, *The Service Industries Journal*, Vol.25, No.2, March 2005, pp.141–161.

[5] Adapted from José Luis Iparraguirre D'Elia, Labour Productivity, *Gross Value Added and Employment by Industry in Northern Ireland. A Structural and Shift-Share Analysis*, Economic Research Institute of Northern Ireland ERINI Monograph 6, December 2005.

[6] Traditional shift-share static comparative analysis contrasts two points in time, but such an exercise is ridden with limitations. The main problem is that it does not take into account changes which might have occurred in the industrial structure within the region under study or the reference geographic unit. Dynamic shift-share studies of the evolution of the components over time help overcome these pitfalls, allowing for period-to-period changes in the components, thus capturing any structural changes which might have occurred, either in the regions/counties or Romania as a whole – see José Luis Iparraguirre D'Elia, Labour Productivity, *Gross Value Added and Employment by Industry in Northern Ireland. A Structural and Shift-Share Analysis*, Economic Research Institute of Northern Ireland ERINI Monograph 6, December 2005. However, for reasons of space, such an analysis will not be presented in this paper.

[7] Namely macroregions, development regions and counties. However, currently the macroregions are more statistical aggregations and not administrative or operational units, while the regions are not administrative units de jure, but entities in charge with regional policy in territory, and the counties are truly administrative units. This is about to change, since a territorial administration reform is envisaged by the Romanian government until the end of 2011.

[8] Suahasil Nazara and Geoffrey J.D. Hewings, Towards Regional Growth Decomposition with Neighbor's Effect: A New Perspective on Shift-Share Analysis, *Regional Economics Application Laboratory (REAL), University of Illinois at Urbana-Champaign,* REAL 03-T-21 June, 2003.

industry aggregation, to the degree of regional disaggregation and to the considered period (initial and/or final observation could influence results[9]); the omission of the impact of intra-regional sectoral linkages[10]. In response to the many limitations of the shift-share method, many modifications and extensions were developed, especially in regional analysis. Thus, Rosenfeld (1959) raised the problem that the regional shift (competitive) effect was not only affected by the special dynamism of the sector, but also affected by the specialization of the regional employment in the activity. Esteban-Marquillas (1972) proposed the use of a homothetic employment in a certain sector and region, leading to the identification of the allocation effect, issues also accentuated by Arcelus (1984) and Haynes and Machunda (1987). Other theoretical advancements of the shift-share analysis include Klaasen and Paelinck (1972), Sakashita (1973), Theil and Gosh (1980), Haynes and Dinc (1997), Dinc and Haynes (1999), while attempts to put the analysis in a probabilistic framework were made by, among others, Buck and Atkins (1976), Berzeg (1978, 1982), and Patterson (1991). Nazara and Hewings (2003) proposed an extension of shift-share analysis to include the spatial structure of regions, proposing also a taxonomy of regional growth decompositions[11], Ramajo-Márquez (2007) decomposes economic change in a region into three additive spatial components, and Kamarianakis and ale Gallo (2003) substitute the traditional shift-share formulation by an analogue based on the intra-regional inter-sector interactions.

Basically, the main idea of the shift-share analysis is that the temporal variations in a certain variable z_{ij} (where *i* refers to the economic sector and *j* to the region) depend on three factors or effects: a *national* effect, which estimate the influence of the national economic growth process, a *sectoral* (*industry-mix*) effect, reflecting the differences between regions in the industry mix and, a *regional* or *competitive* effect measuring the regional differences in the dynamics of sector *i*. Such analysis can provide useful information to policy makers: for the design of policies for a region it could be interesting to know, for instance, what is the influence of its specific sectoral specialization on the economic growth[12].

In this paper, both employment and gross value-added will be used as variables of interest to compute the shift-share decomposition, but the focus will be not on the overall growth, but on the changes in the main sectors, in order to highlight the structural changes undergone both by

[9] Esteban Fernández Vázquez, Bart Los and Carmen Ramos Carvajal, Path Based Shift-Share Analysis: Using Additional Information in Decomposing Regional Economic Changes, University of Oviedo, Department of Applied Economics, Spain and University of Groningen, Growth and Development Center and SOM Research School, The Netherlands.

[10] See, for instance, Yiannis Kamarianakis, Julie Le Gallo, *The evolution of regional productivity disparities in the European Union, 1975-2000*, Groupement de Recherches Economiques et Sociales (GRES), Cahiers du GRES 2003-15, Décembre 2003, David Wadley, Phillip Smith, Straightening up shift-share analysis, *The Annals of Regional Science* (2003) 37:259–261 and Gordon F. Mulligan, Andreas Molin, Estimating population change with a two-category shift-share model, *The Annals of Regional Science* (2004) 38:113–130.

[11] Suahasil Nazara and Geoffrey J.D. Hewings, Towards Regional Growth Decomposition with Neighbor's Effect: A New Perspective on Shift-Share Analysis, *Regional Economics Application Laboratory (REAL), University of Illinois at Urbana-Champaign,* REAL 03-T-21 June, 2003.

[12] Esteban Fernández Vázquez, Bart Los and Carmen Ramos Carvajal, Path Based Shift-Share Analysis: Using Additional Information in Decomposing Regional Economic Changes, University of Oviedo, Department of Applied Economics, Spain and University of Groningen, Growth and Development Center and SOM Research School, The Netherlands.

the Romanian economy as a whole, and by the regional/sub-regional economies as well[13]. A point of departure for the shift-share analysis is the following equation:

$$\text{Total Change} = NS + IM + RS \tag{1}$$

where: NS is the national effect (national share by industry in case of analysis of the main sectors), IM is the share (industry-mix effect) and RS is the regional effect. The calculation of the three components for each sector is the following[14]:

1. *National share by industry*
$$NS = NI^s_{t-1} * [(RO_t/RO_{t-1} - 1)] \tag{2}$$

where: s refers to each sector and t and t-1 to the end and beginning period, respectively, and NI refers to employment (GVA) levels in a certain region/county and Romania to employment (GVA) levels in Romania as a whole.
Thus, the national share by sector is the number of jobs (million lei) in a certain region/county by sector at the beginning of the period under analysis multiplied by the growth rate in total employment (GVA) levels that took place in Romania as a whole over that same period.

2. *Industry Mix*
$$IM = NI^s_{t-1} * [((RO^s_t/RO^s_{t-1}) - 1) - ((RO_t/RO_{t-1}) - 1)] \tag{3}$$

The industry mix component measures the influence of the mix of fast/slow growing industries in a certain region/county compared to that in Romania as a whole net of any Romanian-wide economic effects. A sector with a larger share in total employment (GVA) in a certain region/county than in Romania as a whole will show a positive industry mix if the nation-wide employment (GVA) level in the sector has increased more than employment (GVA) levels have across sectors. On the contrary, if the sector has experienced a higher increase in its employment (GVA) levels than employment (GVA) levels have throughout the economy, an under-represented industry in a certain region/county (compared to its share across Romania) will show a negative structural or industry mix.

3. *Regional Shift*
$$RS = NI^s_{t-1} * [((NI^s_t/NI^s_{t-1}) - 1) - ((RO^s_t/RO^s_{t-1}) - 1)] \tag{4}$$

The regional shift reflects the *competitive* component within a region, namely the dynamic elements unique to the region contributing to its employment and GVA performance. This indicator shows the regions and counties lagging and leading sectors in terms of net employment (GVA) creation as compared to their national counterparts. The regional shift factor can be further decomposed into a *regional comparative advantage component* (CAC) and an *allocation*

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[13] For reasons of data availability, six main sectors were considered for the analysis: A01 - agriculture, forestry, hunting and fishery, A02 – industry, A03 – constructions, A04 – trade, hotels and restaurants, transport and communications, A05 – financial intermediations, real estate and other services for companies, A06 – public administration, education, health and social welfare.

[14] Adapted from José Luis Iparraguirre D'Elia, Labour Productivity, *Gross Value Added and Employment by Industry in Northern Ireland. A Structural and Shift-Share Analysis*, Economic Research Institute of Northern Ireland ERINI Monograph 6, December 2005.

component (AC). This decomposition is important to count for any scale effects that may be in place if regions are very different in size[15].

2. Results

The *overall employment[16]* has grown slightly over the period 2000-2008, but only three regions experienced the same growth of overall employment. However, when analyzing further, one may notice two separate periods of employment change, namely 2000-2004 (when only two regions experienced employment growth) and 2004-2008 (when all but two regions experienced employment growth – see Figure 1). Consequently, the shift-share analysis was conducted for employment change also in the two above-mentioned intervals.

Figure 1. Overall employment change in Romania in 2000-2008, by macroregions and regions, %
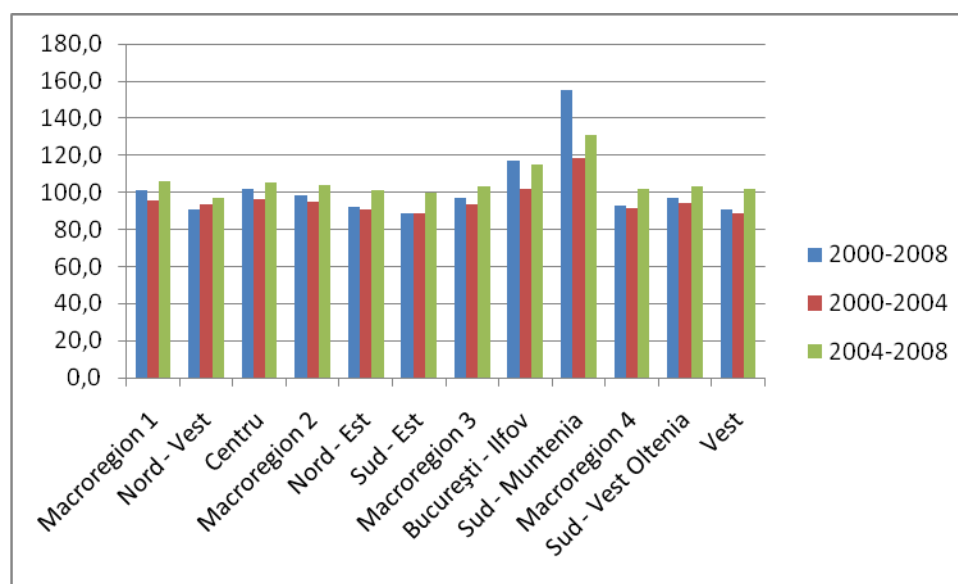
Appendix 1 presents the total change in employment for the main sectors of the Romanian economy, by macroregions, regions and counties. As one may see, there were sectors where virtually all the regions and counties experienced negative changes as compared to employment levels in 2000 (*agriculture, forestry, hunting and fishery*), but also sectors where all the regions and counties experienced positive changes (*constructions* and *financial intermediations and real estate transactions*). Good performance in terms of employment change was also recorded by most of regions and counties in the case of *trade, hotels and restaurants and transports and telecommunications* (better in the second analyzed subinterval) and *public administration,*

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[15] José Luis Iparraguirre D'Elia, Labour Productivity, *Gross Value Added and Employment by Industry in Northern Ireland. A Structural and Shift-Share Analysis*, Economic Research Institute of Northern Ireland ERINI Monograph 6, December 2005.

[16] In this case, employment is considered in a broader sense, referring to the employed population and not to the number of employees. The reason is that in agriculture and, partially, in trade, there are many self-employed people or outside formal employment. A separate analysis was conducted for the number of employees, in connection with labor productivity, whose results are available upon request.

education and health and social welfare (however, with lower performance in the interval 2004-2008 in some counties). In the case of *industry*, many counties experienced negative changes in employment (pointing towards a deindustrialization/industry restructuring process) and slightly better performance in the first analyzed subinterval, but there were also counties that revealed positive changes. On the whole, all these point out towards *deep changes under way in the economic structures* and the *progressive migration from an industrial society to a tertiary society*, which was much delayed in Romania, even in its most advanced regions and counties[17]. Considering the shift-share decomposition, over the period 2000-2008 the *national effect* was positive for all the sectors in all regions and counties, though with different magnitudes, signaling that the overall economic environment had a global positive influence (especially in the interval 2004-2008[18]). In order to compare the *share* and *shift* employment effects for the regions[19] and sectors studied over the period 2000-2008, we use the classification used by D'Elia (2005) (see Table 1).

Table 1. Typology of regions according to the employment industry mix and regional shift, by sectors, 2000-2008

			Industry Mix (IM) – A01	
			Positive	Negative
Regional Shift (RS) – A01	Positive	IM>RS		
		RS>IM		**NE, B, S, V**
	Negative	IM>RS		
		RS>IM		**NV, C, SE, SV**
			Industry Mix (IM) – A02	
			Positive	Negative
Regional Shift (RS) – A02	Positive	IM>RS		
		RS>IM		**NV, SE, SV, V**
	Negative	IM>RS		**C, NE, B**
		RS>IM		**S**
			Industry Mix (IM) – A03	
			Positive	Negative
Regional Shift (RS) – A03	Positive	IM>RS	**NV, C, B**	
		RS>IM		
	Negative	IM>RS	**NE, SE, S, SV, V**	
		RS>IM		
			Industry Mix (IM) – A04	
			Positive	Negative
Regional Shift (RS) – A04	Positive	IM>RS	**NV**	
		RS>IM	**B**	
	Negative	IM>RS	**C, NE, SE, S, SV, V**	

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[17] For a detailed discussion of such an issue, see Pierre-Yves Leo and Jean Philippe, Business Services, the New Engine of French Regional Growth, *The Service Industries Journal*, Vol.25, No.2, March 2005, pp.141–161.
[18] Results available upon request.
[19] A detailed analysis for the Romanian counties is also available upon request.

		RS>IM		
			Industry Mix (IM) – A05	
			Positive	Negative
Regional Shift (RS) – A05	Positive	IM>RS	**B**	
		RS>IM		
	Negative	IM>RS	**NV, C, NE, SE, S, SV, V**	
		RS>IM		
			Industry Mix (IM) – A06	
			Positive	Negative
Regional Shift (RS) – A06	Positive	IM>RS	**S**	
		RS>IM	**B**	
	Negative	IM>RS	**NV, C, NE, SE, SV, V**	
		RS>IM		

Note: A01 - agriculture, forestry, hunting and fishery, A02 – industry, A03 – constructions, A04 – trade, hotels and restaurants, transport and communications, A05 – financial intermediations, real estate and other services for companies, A06 – public administration, education, health and social welfare, and NV – Nord-Vest, C – Centru, NE – Nord-Est, SE – Sud-Est, B – Bucuresti-Ilfov, S – Sud Muntenia, SV – Sud-Vest Oltenia, and V – Vest regions.
Source: Author's computations, following D'Elia (2005).

The results show that in the case of *agriculture* and *industry* the industry mix had negative impacts, but they were offset in some regions by the specific combinations of factors which contributed to a better performance (Nord-Est, Bucuresti-Ilfov, Sud Muntenia and Vest in the case of agriculture and Nord-Vest, Sud-Est, Sud-Vest and Vest in the case of industry). In the case of *constructions*, the Nord-Vest, Centru and Bucuresti-Ilfov regions experienced a positive employment shift, but lower than the industry mix component. Positive shift effects higher than the positive industry mix (pointing towards significant competitive regional features) were recorded only by the Bucuresti-Ilfov region in the case of *trade, hotels and restaurants, transport and communications* and *public administration, education and health and social welfare*, while positive share effects higher than the shift ones (pointing towards competitive reagional and sectoral features not fully exploited) were also recorded by the Bucharest-Ilfov region in the case of financial intermediations and real estate transactions, the Nord-Vest region in the case of *trade, hotels and restaurants, transport and communications* and by the Sud Muntenia region in the case of *public administration, education and health and social welfare.* However, the importance of shift effects (both positive and negative) shows an undergoing period of mobility of activities.
The overall *gross value-added* (GVA) has grown steadily over the analyzed period (2002-2008), the Bucuresti-Ilfov, Sud Muntenia and Vest regions experiencing the highest growths (see Figure 2). In this case, a single shift-share decomposition was conducted for the entire period under study.

Figure 2. Overall gross value-added change in Romania in 2002-2008, by macroregions and regions, 2002=100%
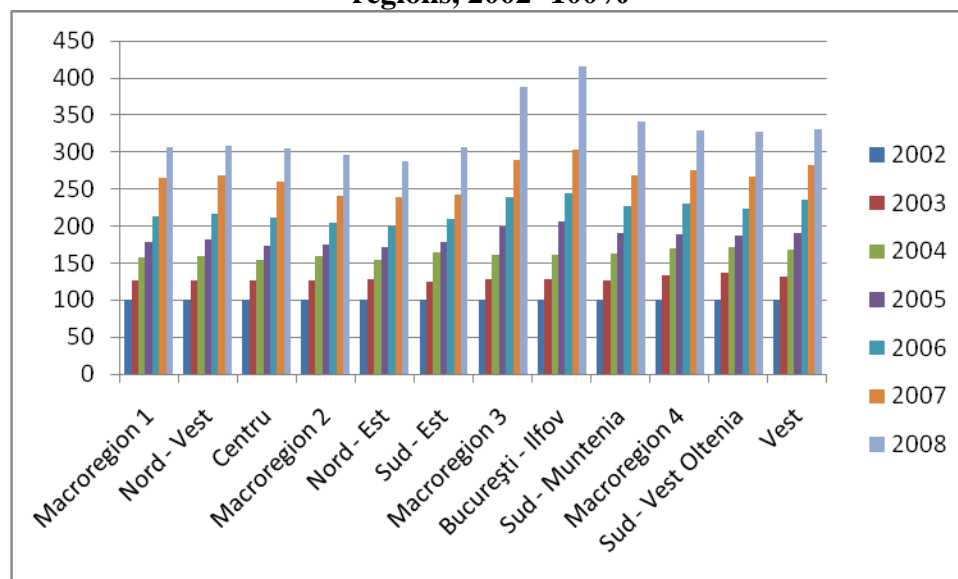
Appendix 2 presents the total change in GVA for the main sectors of the Romanian economy, by macroregions, regions and counties. Different from employment, in all sectors all the regions and counties experienced positive changes as compared to GVA levels in 2002, but with significant differences in magnitude (lowest in the case of *agriculture, forestry, hunting and fishery* and highest in *constructions*). Good performance in terms of GVA change was also recorded by the regions and counties in the case of *trade, hotels and restaurants and transports and telecommunications* and *public administration, education and health and social welfare*. In the case of *industry*, some counties[20] experienced lower changes in GVA growth (pointing towards a deindustrialization/industry restructuring process and/or temporary difficulties). These also point out towards *deep changes under way in the economic structures* and the *progressive "tertialization"* of the regional/subregional economies as well.

Similar to employment, when considering the shift-share decomposition, over the period 2002-2008 the *national effect* was positive for all the sectors in all regions and counties, also with different magnitudes. The *share and shift* GVA effects for the regions and sectors studied over the period 2002-2008 (Table 2) showed some differences as compared to employment decomposition. Thus, contrary to employment, the industry mix had negative impacts in the case of *financial intermediations and real estate transactions*, but there were also regions where specific factors determined a better performance (Centru, Bucuresti-Ilfov and Sud Muntenia). The specific regional factors played also an important part in the better performance of the Sud-Est, Sud Muntenia and Sud-Vest Oltenia in *agriculture*, and of the Sud Muntenia, Sud Vest Oltenia and Vest regions in *industry*. The region with the best performance regarding GVA growth in the tertiary sectors is Bucuresti-Ilfov, while in constructions the best performance due to regional specific features were accounted for by the Bucuresti-Ilfov and Nord-Vest regions. Obviously, further analysis (by counties, for instance or, if possible, by industries), including that

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[20] Bacau, Iasi, Neamt and Suceava in the Nord-Est region, Galati in the Sud-Est region, Brasov and Covasna in the Centru region, and Ialomita in the Sud Muntenia region.

of labor productivity, is needed, in order to bring new insights in the economic growth processes at work in the regional/subregional economies, which otherwise might be overlooked.

Table 2. Typology of regions according to the GVA industry mix and regional shift, by sectors, 2000-2008

			Industry Mix (IM) – A01	
			Positive	Negative
Regional Shift (RS) – A01	Positive	IM>RS		
		RS>IM		**SE, S, SV**
	Negative	IM>RS		
		RS>IM		**NV, C, NE, B, V**
			Industry Mix (IM) – A02	
			Positive	Negative
Regional Shift (RS) – A02	Positive	IM>RS		
		RS>IM		**S, SV, V**
	Negative	IM>RS		**NE**
		RS>IM		**NV, C, SE, B**
			Industry Mix (IM) – A03	
			Positive	Negative
Regional Shift (RS) – A03	Positive	IM>RS	**NV, B**	
		RS>IM		
	Negative	IM>RS	**C, NE, SE, S, SV, V**	
		RS>IM		
			Industry Mix (IM) – A04	
			Positive	Negative
Regional Shift (RS) – A04	Positive	IM>RS		
		RS>IM	**B**	
	Negative	IM>RS	**NV, C, NE, SE, S, SV, V**	
		RS>IM		
			Industry Mix (IM) – A05	
			Positive	Negative
Regional Shift (RS) – A05	Positive	IM>RS		
		RS>IM		**C, B, S**
	Negative	IM>RS		**NV, NE, V**
		RS>IM		**SE, SV**
			Industry Mix (IM) – A06	
			Positive	Negative
Regional Shift (RS) – A06	Positive	IM>RS	**SE**	
		RS>IM	**B**	
	Negative	IM>RS	**NV, C, NE, S, SV, V**	
		RS>IM		

Note: A01 - agriculture, forestry, hunting and fishery, A02 – industry, A03 – constructions, A04 – trade, hotels and restaurants, transport and communications, A05 – financial intermediations, real estate and other services for companies, A06 – public administration, education, health and social welfare, and NV – Nord-Vest, C – Centru, NE – Nord-Est, SE – Sud-Est, B – Bucuresti-Ilfov, S – Sud Muntenia, SV – Sud-Vest Oltenia, and V – Vest regions.
Source: Author's computations, following D'Elia (2005).

Conclusions

Using classical shift-share analysis, the paper attempted an evaluation of the employment and gross value-added disparities for the main sectors of economy in the regions and counties of Romania, by answering questions on how much of the change in the variables was due to changes in the Romanian economy as a whole, to changes in the sectors across Romania or to specific features of a region's economy.

In case of both employment and GVA, the results point towards a process of deep changes in the economic structures and progressive "tertialization" of the regional/subregional economies, much delayed in Romania, even in the most developed regions/counties.

Considering the shift-share decomposition, the national effect was positive for all the sectors in all regions and counties, though with different magnitudes, signaling that the overall economic environment had a global positive influence on both employment and GVA. In terms of shift and share effects, the latter predominated in agriculture and industry, but the importance of shift employment and GVA effects (both positive and negative) in nearly all the studied sectors shows also an undergoing period of mobility of activities, reinforcing the above-mentioned idea of structural changes in the regional/subregional economies.

Further analysis (by counties, for instance or, if possible, by industries), including that of labor productivity, is needed, in order to bring new insights in the economic growth processes at work in the regional/subregional economies that otherwise might be overlooked and to offer useful ideas both for general and specifically targeted policies in the area of regional development.

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Appendix 1

Total change in employment in Romania, in % of 2000 employment, by main sectors of the economy, macroregions, regions and counties

	A01			A02			A03		
	2000-2008	2000-2004	2004-2008	2000-2008	2000-2004	2004-2008	2000-2008	2000-2004	2004-2008
Macroregion 1	-32.6	-23.9	-7.3	-1.9	0.3	-4.2	99.2	29.0	80.6
Nord - Vest	-32.4	-24.0	-7.1	9.2	7.9	-3.6	102.5	26.0	86.6
Bihor	-32.7	-24.1	-7.2	3.6	10.2	-8.7	123.3	27.0	75.9
Bistriţa-Năsăud	-32.5	-24.0	-7.2	52.9	22.2	15.3	158.8	14.2	146.9
Cluj	-32.4	-24.0	-7.3	5.0	7.5	-5.7	84.2	34.8	61.0
Maramureş	-32.6	-24.0	-7.4	10.2	15.9	-9.2	114.5	19.1	111.3
Satu Mare	-32.6	-24.5	-6.3	4.2	-3.1	-1.9	75.9	16.2	176.9
Sălaj	-31.1	-23.3	-6.8	5.0	-6.3	9.7	115.0	17.7	65.2
Centru	-32.9	-23.7	-7.6	-10.6	-6.3	-4.7	95.8	32.4	74.9
Alba	-29.4	-22.9	-5.1	-10.4	-5.4	-0.5	88.6	75.1	112.9
Braşov	-36.1	-22.9	-11.4	-29.8	-17.4	-13.7	122.4	29.0	91.7
Covasna	-33.1	-22.4	-7.8	9.2	13.3	-5.1	156.3	10.8	81.8
Harghita	-34.4	-25.7	-6.9	-2.7	-4.9	0.5	123.3	16.2	186.4
Mureş	-33.2	-23.4	-8.1	-4.3	-0.9	-7.9	62.5	36.7	44.0
Sibiu	-32.4	-24.5	-6.8	-0.8	-4.4	5.3	71.4	30.7	44.2
Macroregion 2	-32.4	-23.6	-7.3	-10.5	-1.6	-9.5	70.4	24.4	56.0
Nord - Est	-32.0	-23.8	-6.7	-17.4	-6.5	-14.0	71.7	22.4	63.4
Bacău	-31.7	-24.1	-5.7	-26.5	-12.3	-20.2	91.7	12.9	57.8
Botoşani	-32.1	-24.1	-6.3	-8.9	-4.9	-9.1	68.4	85.4	72.7
Iaşi	-31.8	-24.0	-6.6	-22.0	-5.6	-14.0	96.1	6.9	91.0
Neamţ	-32.1	-23.2	-7.5	-12.4	-11.3	-9.0	28.2	26.1	18.2
Suceava	-32.4	-23.9	-6.9	-9.2	3.0	-13.4	43.2	46.7	64.4

Vaslui	-31.8	-23.3	-7.0	-12.1	-1.0	-13.0	70.0	58.3	55.6
Sud - Est	-32.9	-23.4	-8.1	-2.2	5.4	-3.7	69.2	26.0	49.2
Brăila	-32.6	-22.1	-8.6	-27.5	13.6	-11.3	83.6	33.3	93.1
Buzău	-31.5	-21.8	-8.4	16.2	18.7	-5.1	74.5	59.2	10.6
Constanţa	-33.7	-26.0	-6.6	23.0	16.4	7.9	76.4	24.8	47.2
Galaţi	-34.8	-24.0	-8.5	-17.6	-14.2	-5.7	42.5	11.9	35.7
Tulcea	-33.5	-22.0	-11.5	3.4	9.5	-13.0	35.9	18.8	44.1
Vrancea	-31.8	-23.3	-6.9	1.8	1.5	-2.0	135.5	32.8	90.9
Macroregion 3	-31.5	-22.7	-7.6	-7.7	1.1	-8.0	125.8	39.1	84.1
Bucureşti - Ilfov	-24.8	-16.6	-9.5	-11.1	0.8	-10.9	156.7	48.9	98.5
Ilfov	-31.7	-24.7	-6.1	73.9	16.4	33.3	320.0	29.3	182.1
Municipiul Bucureşti	45.8	26.0	-27.8	-19.8	-1.3	-16.3	151.3	49.8	95.3
Sud - Muntenia	-32.1	-23.3	-7.4	-5.1	1.4	-5.7	80.9	25.6	59.7
Argeş	-32.4	-24.0	-7.4	-21.3	-12.2	-5.3	94.5	51.4	72.0
Călăraşi	-33.9	-25.5	-6.4	15.1	24.7	-12.8	50.0	48.5	72.7
Dâmboviţa	-32.0	-24.2	-6.5	4.0	10.3	-3.7	52.9	38.9	37.5
Giurgiu	-32.3	-22.9	-8.6	15.2	6.9	-2.2	214.3	38.3	104.2
Ialomiţa	-30.8	-20.7	-7.9	43.9	18.0	-0.7	110.3	12.2	96.9
Prahova	-31.1	-22.4	-7.8	0.0	3.9	-5.3	68.1	12.7	44.7
Teleorman	-32.1	-22.9	-7.6	-16.2	-4.0	-11.5	53.8	-2.1	61.9
Macroregion 4	-32.4	-24.0	-6.7	4.5	5.4	-3.1	66.6	20.0	59.5
Sud - Vest Oltenia	-32.9	-24.4	-7.2	-2.7	1.4	-5.5	61.6	16.3	66.4
Dolj	-32.3	-24.3	-6.7	-3.4	4.7	-3.0	86.5	18.4	70.8
Gorj	-31.9	-23.3	-7.1	-21.1	-9.1	-15.5	61.9	18.8	60.8
Mehedinţi	-32.6	-23.4	-7.9	-0.5	-3.4	-5.9	72.3	2.4	66.7
Olt	-33.4	-24.5	-7.8	6.3	5.4	0.3	100.0	6.9	76.4
Vâlcea	-34.2	-26.0	-6.5	14.9	12.4	-0.9	18.4	34.2	59.3
Vest	-31.4	-23.3	-5.9	10.5	8.6	-1.1	72.6	23.7	52.3
Arad	-32.0	-21.6	-7.4	52.0	16.9	8.8	63.6	24.1	42.0
Caraş-Severin	-34.0	-25.1	-6.6	-14.9	-9.2	-5.1	77.8	30.3	53.2
Hunedoara	-31.1	-23.5	-5.5	-12.7	0.8	-9.9	43.4	7.5	48.5
Timiş	-29.7	-23.2	-4.6	17.6	15.2	0.6	102.7	31.4	62.4

	A04			A05			A06		
	2000-2008	2000-2004	2004-2008	2000-2008	2000-2004	2004-2008	2000-2008	2000-2004	2004-2008
Macroregion 1	42.6	20.4	20.8	75.1	31.3	43.0	11.8	1.5	9.9
Nord - Vest	50.8	16.8	23.2	73.4	37.6	47.2	14.0	1.4	13.0
Bihor	34.2	14.0	14.7	84.7	33.1	57.9	16.7	3.0	14.3
Bistriţa-Năsăud	75.4	32.9	36.0	41.2	67.4	17.6	16.0	-0.2	10.4

Cluj	67.8	25.3	29.0	118.5	44.3	75.0	17.5	3.3	15.3
Maramureș	26.0	12.9	10.1	53.2	26.8	29.5	0.9	-1.1	4.2
Satu Mare	68.1	-0.2	28.2	41.5	31.1	27.7	17.5	-0.9	20.1
Sălaj	50.4	15.5	33.1	2.3	20.8	2.5	14.7	0.8	13.0
Centru	35.1	24.3	18.4	76.8	25.8	38.9	9.4	1.6	6.5
Alba	40.8	38.5	11.8	40.4	60.4	-8.3	11.2	-0.7	4.0
Brașov	43.4	22.7	23.4	82.7	15.0	45.1	11.0	5.3	3.3
Covasna	15.8	21.2	15.6	64.0	16.1	21.4	-0.9	-3.1	4.8
Harghita	9.1	0.4	36.2	72.7	11.6	48.6	11.3	-0.2	9.4
Mureș	34.7	41.6	12.6	84.5	39.0	49.1	13.6	5.7	10.5
Sibiu	48.8	15.0	15.0	100.0	20.8	72.7	4.4	-2.6	6.7
Macroregion 2	26.8	10.7	18.3	56.0	27.0	23.9	14.8	3.0	10.8
Nord - Est	25.8	7.2	18.8	44.6	30.4	20.4	15.1	3.9	10.3
Bacău	19.3	-0.7	13.6	18.3	58.8	25.0	16.7	0.6	13.9
Botoșani	31.8	19.1	24.5	57.6	42.5	21.6	10.0	4.9	2.3
Iași	19.1	3.3	18.3	78.6	27.8	27.4	11.4	7.2	2.3
Neamț	24.9	29.5	9.1	41.8	28.1	16.7	8.5	3.0	9.7
Suceava	42.1	8.3	22.1	30.6	25.5	11.8	15.9	1.8	13.8
Vaslui	23.0	-9.8	41.5	32.4	4.5	10.3	35.8	3.9	32.4
Sud - Est	27.8	14.4	17.7	68.7	23.8	27.4	14.5	1.8	11.5
Brăila	35.8	-5.5	57.5	82.1	32.9	30.6	19.1	-5.2	21.8
Buzău	56.8	14.0	19.8	58.5	30.6	19.1	5.4	-7.7	9.6
Constanța	28.4	18.3	10.9	108.5	29.6	25.7	13.2	8.7	6.4
Galați	8.0	19.0	6.6	48.3	5.6	39.1	14.9	1.1	11.8
Tulcea	0.8	-20.1	29.2	44.4	31.3	10.3	23.2	8.6	19.2
Vrancea	52.0	38.0	26.3	22.5	14.0	25.7	18.0	4.5	9.0
Macroregion 3	57.2	17.6	36.2	111.0	29.6	63.6	27.2	11.0	15.1
București - Ilfov	78.9	17.2	49.2	132.1	31.8	76.9	35.2	16.8	19.3
Ilfov	201.3	44.4	117.5	179.2	47.1	106.3	18.4	7.3	16.0
Municipiul București	69.5	15.2	43.1	129.6	31.0	75.4	36.8	17.6	19.6
Sud - Muntenia	27.7	18.0	17.5	53.9	23.6	23.1	18.5	5.2	10.4
Argeș	19.3	23.3	12.1	60.0	16.1	28.2	13.0	1.9	10.5
Călărași	35.4	20.8	18.6	59.3	35.0	22.2	31.3	16.3	20.8
Dâmbovița	47.8	42.9	13.0	47.5	47.9	19.4	20.6	-1.0	8.5
Giurgiu	0.0	0.4	17.7	54.2	62.3	7.1	13.2	4.3	9.8
Ialomița	31.5	10.8	24.0	69.6	54.9	20.0	32.5	21.0	8.7
Prahova	35.9	11.8	21.9	54.3	12.5	29.9	18.4	4.5	7.7
Teleorman	5.1	1.1	18.4	33.3	11.7	5.3	11.8	7.0	12.9
Macroregion 4	28.3	10.9	18.3	67.5	35.2	24.1	12.7	3.3	9.9
Sud - Vest	26.9	2.5	22.1	67.5	28.6	28.1	13.9	1.2	11.7

Oltenia									
Dolj	34.4	4.8	23.6	65.4	11.8	50.0	15.9	5.5	12.4
Gorj	3.0	-2.4	0.5	74.5	39.5	25.4	12.8	1.8	11.6
Mehedinţi	26.7	-15.2	31.0	62.9	29.7	15.4	9.5	-4.3	11.3
Olt	12.2	3.0	15.6	42.9	22.0	4.5	14.5	0.4	9.6
Vâlcea	21.0	16.2	13.8	87.8	49.0	27.6	13.6	-1.3	13.1
Vest	33.8	18.7	19.4	67.5	41.2	21.1	11.6	5.4	8.1
Arad	15.7	9.9	8.4	67.1	58.5	12.3	14.6	-1.2	13.8
Caraş-Severin	14.0	-7.5	15.6	42.1	19.1	19.5	2.5	7.8	9.1
Hunedoara	34.7	29.6	13.8	26.8	29.7	4.1	14.1	3.8	11.0
Timiş	55.8	32.9	33.0	105.2	45.2	36.9	12.7	9.2	3.2

Note: A01 - agriculture, forestry, hunting and fishery, A02 – industry, A03 – constructions, A04 – trade, hotels and restaurants, transport and communications, A05 – financial intermediations, real estate and other services for companies, A06 – public administration, education, health and social welfare.
Source: Author's computations, on the basis of Romanian territorial statistics.

Appendix 2

Total change in gross value-added in Romania, in % of 2002 GVA, by main sectors of the economy, macroregions, regions and counties

	A01	A02	A03	A04	A05	A06
	2002-2008	2002-2008	2002-2008	2002-2008	2002-2008	2002-2008
Macroregion 1	73.4	179.2	500.2	260.1	185.8	247.5
Nord - Vest	69.1	188.5	567.2	279.3	157.4	245.6
Bihor	115.9	155.9	567.2	228.7	127.2	240.9
Bistriţa-Năsăud	50.0	344.2	582.9	274.3	192.3	223.2
Cluj	38.0	176.7	540.2	343.3	191.6	263.3
Maramureş	77.5	154.9	569.6	294.7	142.8	210.4
Satu Mare	43.7	190.9	844.5	215.6	66.7	271.7
Sălaj	82.4	280.6	418.3	270.8	271.2	252.7
Centru	78.5	172.0	442.5	240.3	221.8	249.5
Alba	85.5	310.6	567.3	259.5	429.6	211.1
Braşov	76.4	121.6	586.0	264.5	221.6	264.5
Covasna	47.4	133.3	380.1	168.5	252.8	255.2
Harghita	63.5	181.7	793.6	200.3	165.9	273.5
Mureş	111.8	140.3	227.3	207.1	173.2	228.2
Sibiu	66.0	221.7	412.2	278.9	183.8	276.8
Macroregion 2	94.2	143.7	431.5	222.5	224.8	270.6
Nord - Est	64.8	118.7	469.2	244.0	238.1	264.9
Bacău	40.7	84.6	457.7	203.8	176.2	272.9
Botoşani	69.3	175.1	527.1	228.3	446.1	239.7
Iaşi	88.0	123.3	546.6	280.0	239.8	288.3
Neamţ	69.1	120.9	290.5	275.3	256.6	233.1

	A01	A02	A03	A04	A05	A06
Suceava	52.7	121.3	469.7	256.7	191.3	234.2
Vaslui	75.0	170.0	605.4	192.0	379.3	312.2
Sud - Est	135.3	168.5	401.9	204.6	210.6	278.1
Brăila	169.0	151.9	516.5	300.7	198.1	317.2
Buzău	142.7	237.5	453.5	230.7	191.0	217.3
Constanţa	185.0	185.1	347.6	169.0	241.3	290.3
Galaţi	131.0	125.0	450.0	226.7	245.5	263.7
Tulcea	106.9	142.2	345.1	193.7	239.7	326.5
Vrancea	66.8	161.4	482.9	285.4	128.0	281.6
Macroregion 3	126.9	208.5	680.7	340.4	238.3	304.0
Bucureşti - Ilfov	76.8	178.5	786.6	377.7	234.6	331.3
Ilfov	52.7	220.0	1393.9	654.1	353.5	352.8
Municipiul Bucureşti	261.9	171.5	768.5	352.5	228.7	330.2
Sud - Muntenia	130.9	243.7	462.6	246.9	249.1	249.4
Argeş	126.3	265.1	496.9	250.3	402.6	237.6
Călăraşi	149.5	282.3	697.4	218.1	484.2	340.3
Dâmboviţa	122.9	217.9	388.1	252.6	226.6	219.8
Giurgiu	139.0	173.3	766.0	228.1	131.1	232.2
Ialomiţa	173.6	136.5	394.2	253.0	141.0	284.8
Prahova	180.0	266.7	397.4	266.1	204.4	246.9
Teleorman	64.4	174.9	548.0	187.4	262.7	247.3
Macroregion 4	111.8	223.2	424.5	252.8	207.5	251.7
Sud - Vest Oltenia	156.8	203.9	409.4	238.0	217.9	243.3
Dolj	413.8	238.8	501.1	249.5	261.6	249.4
Gorj	69.1	166.8	322.8	217.1	252.0	288.3
Mehedinţi	154.9	149.6	406.3	266.4	217.7	221.7
Olt	128.2	261.6	439.5	207.6	193.6	227.7
Vâlcea	56.0	217.1	384.9	249.5	153.7	226.7
Vest	77.7	242.5	439.6	263.9	200.6	259.7
Arad	113.2	321.0	384.9	184.4	177.9	232.9
Caraş-Severin	83.3	224.5	335.2	242.5	150.9	242.1
Hunedoara	38.3	201.5	296.3	251.9	199.1	239.4
Timiş	67.7	236.2	644.5	333.0	228.5	291.3

Note: A01 - agriculture, forestry, hunting and fishery, A02 – industry, A03 – constructions, A04 – trade, hotels and restaurants, transport and communications, A05 – financial intermediations, real estate and other services for companies, A06 – public administration, education, health and social welfare.
Source: Author's computations, on the basis of Romanian territorial statistics.