

## **SUB-REGIONAL DISPARITIES IN ROMANIA – THE CASE OF THE CENTRU REGION**

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### **Abstract.**

*The paper attempts to assess the evolution of the sectoral development disparities (in what regards value-added and employment, for the main sectors of the economy) in the counties of the Centru Region of Romania. Using shift-share analysis, we investigate the extent to which the existing intra-regional inequalities can be attributed to different factors, such as industry mix, and to national/county specific factors. The results reveal different evolutions of the Centru Region's counties and might provide some useful insights for regional development policies.*

**Keywords:** *regional disparities, shift-share analysis, regional development*

**JEL classification:** *O18, R11, R12, R30*

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### **1. Introduction**

The shift-share analysis is a methodology used to get information about the determinants of regional growth processes, which may address the changes in the output growth (or Gross Value Added dynamics – GVA henceforth), employment growth and productivity growth<sup>2</sup> by industry and region, as key elements of how a region is performing. Using the tools of classical shift-share analysis, the paper attempts to assess the sectoral development disparities (in what regards value-added and employment, for the

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main sectors of economy) in the Centru region of Romania, attempting to answer questions such as<sup>34</sup> :

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

Due to data availability, the shift-share analysis of employment covers the years 2000 to 2008, while that of GVA covers the period 2002-2008.

## **2. The Shift-Share Method**

As shown in the literature<sup>4</sup> , the shift-share 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 national basis, minus the precedent global

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<sup>2</sup> Fernández Vázquez E., Los B. and Ramos Carvajal C., *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.

<sup>3</sup> Adapted from Iparraguirre D'Elia J.L., *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 and Chilian M.N. Evolution of Regional and Sub-Regional Disparities in Romania – A Sectorial Shift-Share Analysis, *Romanian Journal of Economic Forecasting*, Vol XV, No. 1/2012, pp. 187-204.

<sup>4</sup> For details, see, for instance, Nazara S. and Hewings G.J.D., *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.

component; and iii) a shift component (also called regional-shift or competitive effect), resulting from the difference between the evolutions 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<sup>5</sup>. 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<sup>6</sup>.

In this paper, both employment and gross value-added are used to compute the shift-share decomposition, with the focus on the changes in the main sectors, in order to highlight the structural changes undergone, beside the Romanian economy, by the economy of the Centru Region. The basic equation of the shift-share analysis is the following<sup>7</sup>:

$$\text{Total Change} = \text{NS} + \text{IM} + \text{RS} \quad (1)$$

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:

1. National share by industry

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<sup>5</sup> Leo P.Y. and Philippe J., “Business Services, the New Engine of French Regional Growth”, *The Service Industries Journal*, Vol. 25, No. 2, March 2005, pp. 141–161.

<sup>6</sup> Fernández Vázquez E., Los B. and Ramos Carvajal C., *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.

<sup>7</sup> 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.

<sup>8</sup> Adapted from Iparraguirre D’Elia J.L., *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.

$$NS = NI_{st-1} * [(RO_t / RO_{t-1} - 1)]$$

(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 reflects how much the GVA/employment in each industry and region/county would have changed if they had experienced the same behavior as the overall development in Romania.

## 2. Industry Mix

$$IM = NI_{st-1} * [((RO_{st} / RO_{st-1}) - 1) - ((RO_t / RO_{t-1}) - 1)]$$

(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<sup>9</sup>.

## 3. Regional Shift

$$RS = NI_{st-1} * [((NI_{st} / NI_{st-1}) - 1) - ((RO_{st} / RO_{st-1}) - 1)]$$

(4)

The regional shift reflects the competitive component within a region, namely the dynamic elements specific to the region/county 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.

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<sup>9</sup> Chilian M.N. Evolution of Regional and Sub-Regional Disparities in Romania – A Sectoral Shift-Share Analysis, *Romanian Journal of Economic Forecasting*, Vol XV, No. 1/2012, pp. 187-204.

**3. Results**

**3.1 Employment Developments**

Table 1 presents the total change in employment by the main sectors of the Romanian economy in the Centru region and its counties, in the entire period and by two subintervals. As one may see, there were sectors where all the counties of the Centru Region experienced negative changes as compared to the employment levels in 2000 (agriculture, forestry, hunting and fishery – except for Covasna County in the interval 2004-2008), but also sectors where all the counties experienced positive changes (constructions, trade, hotels and restaurants and financial intermediations and real estate transactions). Good performance in terms of employment change was also recorded by most of the counties in the case of public administration, education and health and social welfare (however, with lower performance in the interval 2000-2004 in Alba, Covasna, Harghita and Sibiu counties). In the case of industry, most of the counties experienced negative changes in employment (pointing towards a deindustrialization/industry restructuring process), but also slightly better performance in the second analyzed subinterval (Sibiu, Harghita, Alba and even Brasov). On the whole, all these point out towards the progressive migration from an industrial society to a tertiary society, but maintaining a key role of industry as development factor.

**Table 1. Total Change in Employment the Centru Region, in % of 2000 Employment, by Main Sectors of the Economy**

	A01			A02			A03		
	2000-2008	2000-2004	2004-2008	2000-2008	2000-2004	2004-2008	2000-2008	2000-2004	2004-2008
<b>Centru</b>	-32.9	-23.7	-7.6	-10.6	-6.3	-4.7	95.8	32.4	74.9
<b>Alba</b>	-29.4	-22.9	-5.1	-10.4	-5.4	-0.5	88.6	75.1	112.9
<b>Braşov</b>	-36.1	-22.9	-11.4	-29.8	-17.4	-13.7	122.4	29.0	91.7
<b>Covasna</b>	33.1	-22.4	-7.8	9.2	13.3	-5.1	156.3	10.8	81.8
<b>Harghita</b>	34.4	-25.7	-6.9	-2.7	-4.9	0.5	123.3	16.2	186.4

<b>Mureș</b>	-								
	33.2	-23.4	-8.1	-4.3	-0.9	-7.9	62.5	36.7	44.0
<b>Sibiu</b>	-								
	32.4	-24.5	-6.8	-0.8	-4.4	5.3	71.4	30.7	44.2
	<b>A04</b>			<b>A05</b>			<b>A06</b>		
	<b>2000-2008</b>	<b>2000-2004</b>	<b>2004-2008</b>	<b>2000-2008</b>	<b>2000-2004</b>	<b>2004-2008</b>	<b>2000-2008</b>	<b>2000-2004</b>	<b>2004-2008</b>
<b>Centru</b>	35.1	24.3	18.4	76.8	25.8	38.9	9.4	1.6	6.5
<b>Alba</b>	40.8	38.5	11.8	40.4	60.4	-8.3	11.2	-0.7	4.0
<b>Brașov</b>	43.4	22.7	23.4	82.7	15.0	45.1	11.0	5.3	3.3
<b>Covasna</b>	15.8	21.2	15.6	64.0	16.1	21.4	-0.9	-3.1	4.8
<b>Harghita</b>	9.1	0.4	36.2	72.7	11.6	48.6	11.3	-0.2	9.4
<b>Mureș</b>	34.7	41.6	12.6	84.5	39.0	49.1	13.6	5.7	10.5
<b>Sibiu</b>	48.8	15.0	15.0	100.0	20.8	72.7	4.4	-2.6	6.7

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: Authors' computations, on the basis of Romanian territorial statistics.

Considering the shift-share decomposition over the period 2000-2008<sup>109</sup>, when detailing by the two sub-periods mentioned above, the national effect revealed significant differences, suggesting different exposures of sectors and counties to the employment changes that occurred in the Romanian economy as a whole. Thus, over the interval 2000-2004 it was negative in all the sectors and counties, while over the interval 2004-2008 it

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Detailed results are available upon request

was positive in all the sectors and counties, offsetting the previous negative impacts. We believe this happened because 2000-2004 was an interval of slow economic growth, but with significant structural shifts induced by the prospects of accession to the EU, while 2004-2008 was an interval of accelerated economic growth and relative prosperity, during which the previous sectoral shifts were consolidated.

In order to compare the share and shift employment effects for the counties and sectors studied over the period 2000-2008, we use the classification used by D’Elia (2005)<sup>110</sup> (see Table 2).

**Table 2. Typology of Centru Region Counties According to the Employment Industry Mix and Regional Shift, by Sectors, 2000-2008**

			Industry Mix (IM) – A01	
			Positive	Negative
<b>Regional Shift (RS) – A01</b>	Positive	IM better than RS		
		RS better than IM		<b>AB</b>
	Negative	IM better than RS		
		RS better than IM		<b>BV, CV, HR, MS, SB</b>
			Industry Mix (IM) – A02	
			Positive	Negative
<b>Regional Shift (RS) – A02</b>	Positive	IM better than RS		
		RS better than IM		<b>CV, HR, SB</b>

<sup>11</sup> Iparraguirre D’Elia J.L., 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.

	Negative	IM better than RS		<b>AB, BV</b>
		RS better than IM		<b>MS</b>
			<b>Industry Mix (IM) – A03</b>	
			Positive	Negative
<b>Regional Shift (RS) – A03</b>	Positive	IM better than RS	<b>BV, CV, HR</b>	
		RS better than IM		
	Negative	IM better than RS	<b>AB, MS, SB</b>	
		RS better than IM		
			<b>Industry Mix (IM) – A04</b>	
			Positive	Negative
<b>Regional Shift (RS) – A04</b>	Positive	IM better than RS	<b>AB, BV, SB</b>	
		RS better than IM		
	Negative	IM better than RS	<b>CV, HR, MS</b>	
		RS better than IM		
			<b>Industry Mix (IM) – A05</b>	
			Positive	Negative
<b>Regional Shift (RS) – A05</b>	Positive	IM better than RS	<b>SB</b>	
		RS better than IM		



	Negative	IM better than RS	<b>AB, BV, CV, HR, MS</b>	
		RS better than IM		
			<b>Industry Mix (IM) – A06</b>	
			Positive	Negative
<b>Regional Shift (RS) – A06</b>	Positive	IM better than RS		
		RS better than IM		
	Negative	IM better than RS	<b>AB, BV, CV, HR, MS, SB</b>	
		RS better than 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 AB – Alba County; BV – Brasov County; CV – Covasna County; HR – Harghita County; MS – Mures County; SB – Sibiu County.

Source: Authors' computations, following D'Elia (2005).

The results show that in the case of agriculture, the industry mix had negative impacts and only in the Alba County it was offset by a combination of specific factors that contributed to a better performance in terms of competitiveness. In the case of industry, the industry mix had also negative impacts in all the counties, but positive competitive effects pointing towards strong competitive features were noticed in Covasna, Harghita and Sibiu counties, and negative competitive effects, but higher than the industry mix (signaling certain competitive features) were noticed in Mures County. In the case of constructions, Brasov, Covasna and Harghita counties experienced a positive employment shift, but lower than the industry mix effect (pointing towards certain competitive regional and sectoral features, but not fully exploited), while in the case of trade, hotels and restaurants, transport and communications a positive employment shift was recorded by Alba, Brasov and Sibiu counties, also lower than the industry mix effect. In the case of

financial intermediations and real estate transactions, only Sibiu County revealed a positive employment shift, but lower than the industry mix, while in the case of public administration, education and health and social welfare all the counties experienced negative employment shifts. All these reveal a period of dual developments: a significant sectoral shift towards a tertiary economy and in-sector restructuring towards augmenting county “sectoral strong points” and increasing competitiveness.

### **3.2 Gross Value-Added Developments**

Table 3 presents the total change in GVA for the main sectors of the Romanian economy in the Centru region and its counties over the interval 2002-2008. Different from employment, in all sectors all the counties of the Centru Region experienced positive changes as compared to the GVA levels in 2002, but with significant differences in magnitude (lowest in the case of agriculture, forestry, hunting and fishery and highest in constructions).

**Table 3. Total Change in Gross Value-Added in the Centru Region, in % of 2002 GVA, by Main Sectors of the Economy**

	A01	A02	A03	A04	A05	A06
	2002-2008	2002-2008	2002-2008	2002-2008	2002-2008	2002-2008
<b>Centru</b>	<b>78.5</b>	<b>172.0</b>	<b>442.5</b>	<b>240.3</b>	<b>221.8</b>	<b>249.5</b>
<b>Alba</b>	<b>85.5</b>	<b>310.6</b>	<b>567.3</b>	<b>259.5</b>	<b>429.6</b>	<b>211.1</b>
<b>Braşov</b>	<b>76.4</b>	<b>121.6</b>	<b>586.0</b>	<b>264.5</b>	<b>221.6</b>	<b>264.5</b>
<b>Covasna</b>	<b>47.4</b>	<b>133.3</b>	<b>380.1</b>	<b>168.5</b>	<b>252.8</b>	<b>255.2</b>

<b>Harghita</b>	<b>63.5</b>	<b>181.7</b>	<b>793.6</b>	<b>200.3</b>	<b>165.9</b>	<b>273.5</b>
<b>Mureş</b>	<b>111.8</b>	<b>140.3</b>	<b>227.3</b>	<b>207.1</b>	<b>173.2</b>	<b>228.2</b>
<b>Sibiu</b>	<b>66.0</b>	<b>221.7</b>	<b>412.2</b>	<b>278.9</b>	<b>183.8</b>	<b>276.8</b>

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: Authors’ computations, on the basis of Romanian territorial statistics.

Similar to employment, when considering the shift-share decomposition over the period 2002-2008<sup>11</sup> the national effect was positive for all the sectors in all counties, better correlated with the productive endowment at county level. However, the share and shift GVA effects for the regions, counties and sectors studied over the period 2002-2008 (Table 4) showed some differences as compared to employment decomposition.

**Table 4. Typology of Centru Region Counties According to the GVA Industry Mix and Regional Shift, by Sectors, 2000-2008**

			<b>Industry Mix (IM) – A01</b>	
			Positive	Negative
<b>Regional Shift (RS) – A01</b>	Positive	IM better than RS		
		RS better than IM		<b>MS</b>
	Negative	IM better than RS		
		RS better than IM		<b>AB, BV, CV, HR, SB</b>
			<b>Industry Mix (IM) – A02</b>	
			Positive	Negative
<b>Regional Shift</b>	Positive	IM better than		

<sup>11</sup> Detailed results are available upon request

<b>(RS) – A02</b>		RS		
		RS better than IM		<b>AB, SB</b>
	Negative	IM better than RS		<b>CV, MS</b>
		RS better than IM		<b>BV, HR</b>
			<b>Industry Mix (IM) – A03</b>	
			Positive	Negative
<b>Regional Shift (RS) – A03</b>	Positive	IM better than RS	<b>AB, BV, HR</b>	
		RS better than IM		
	Negative	IM better than RS	<b>CV, MS, SB</b>	
		RS better than IM		
			<b>Industry Mix (IM) – A04</b>	
			Positive	Negative
<b>Regional Shift (RS) – A04</b>	Positive	IM better than RS		
		RS better than IM		
	Negative	IM better than RS	<b>AB, BV, CV, HR, MS, SB</b>	
		RS better than IM		
			<b>Industry Mix (IM) – A05</b>	
			Positive	Negative
<b>Regional Shift (RS) – A05</b>	Positive	IM better than RS		
		RS better than IM		<b>AB, BV, CV</b>
	Negative	IM better than RS		<b>HR, MS, SB</b>
		RS better than IM		
			<b>Industry Mix (IM) – A06</b>	
			Positive	Negative
<b>Regional Shift (RS) – A06</b>	Positive	IM better than RS	<b>SB</b>	
		RS better than IM		
	Negative	IM better than	<b>AB, BV, CV,</b>	

		RS	<b>HR, MS</b>	
		RS better than 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 AB – Alba County; BV – Brasov County; CV – Covasna County; HR – Harghita County; MS – Mures County; SB – Sibiu County.

Source: Authors’ computations, following D’Elia (2005).

Thus, contrary to employment, the industry mix had negative impacts in the case of financial intermediations and real estate transactions, but there were counties where specific factors determined a better performance (Alba, Brasov and Covasna counties). The specific county factors played also an important part in the better performance of Mures County in agriculture, and of Alba and Sibiu counties in industry. The counties with the best performance regarding GVA growth in constructions were Alba, Brasov and Harghita, but lower than the industry mix effect (pointing towards certain competitive regional and sectoral features, but not fully exploited), while in trade, hotels and restaurants and transports and telecommunications the GVA growth potentials of all counties were clearly underachieved. A positive competitive effect higher than the industry mix effect was also noticed in the case of public administration, education and health and social welfare only in Sibiu County.

#### **4. Conclusions**

Using the shift-share analysis, the paper attempted to evaluate the employment and gross value-added disparities for the main sectors of economy in the counties of the Centru Region, 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 county’s economy.

In case of both employment and GVA, the results point towards ongoing changes in the economic structures in favor of progressive “tertilization” of the subregional economies, but also towards the still important role of industry in the economies of the counties of the Centru region.

Considering the shift-share decomposition, the national effect was positive over the entire analyzed period for all the sectors in all regions and counties, with different magnitudes and correlated with the productive endowment, signaling that the overall economic environment had a positive influence on both employment and GVA. One should also mention that in terms of employment the national effect was negative over the interval 2000-2004, when significant structural shifts induced by the prospects of accession to the EU occurred.

In terms of shift and share effects, the latter predominated in agriculture and industry, correlated with the productive endowments of counties. The magnitude of shift employment and GVA effects (both positive and negative) in nearly all the studied sectors also reveal a period of mobility of activities, reinforcing the above-mentioned idea of significant structural changes in the subregional economies. However, further analysis, especially that of labor productivity, is needed in order to analyze further the economic growth processes at work in the subregional economies of the Centru Region and to provide useful ideas for the regional development policies, such as the social cohesion policy, the rural development policy, the territorial cohesion policy, as well as for general policies such as the competitiveness policy (with specific focus on cluster development and sustainability, for instance), the education and R&D policy, etc.

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