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Regional structural change and growth in Romania

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Abstract

This paper brings empirical evidence about patterns and changes in regional specialisation and geographical concentration of industrial activity in Romania during the period 1991-1999. We find a tendency of increasing absolute and relative regional specialisation. Most manufacturing industries have become more concentrated. While the degree of concentration remained almost the same in the period 1993-1998, the concentration of the Gross Domestic Product (GDP) per capita increased, suggesting a tendency towards income polarisation. Regional specialisation is found to be negatively related to regional GDP and unemployment rates.

Keywords: Regional specialisation, Location of industrial activity, Accession countries

JEL classification: F15, R11, R12

Introduction

During the last two decades, there has been a growing concern in Europe about potential vulnerability of regions due to increasing economic integration. The fear is that structural change which accompanies European integration is likely to increase the degree of regional specialisation and geographic concentration of industrial activity which may make regions vulnerable to asymmetric shocks. Industry demand shocks may become region-specific shocks so there may be winners and losers among regions. On the other hand, higher specialisation and concentration of industrial activity are expected to increase productivity via increasing economies of scale.

What impact has had increasing economic integration with the European Union (EU) on regional specialisation and location of industrial activity in accession countries? Does greater specialisation imply greater polarisation?

Traditional trade theory (Ricardo, 1817; Heckscher, 1919; Ohlin, 1933) have explained specialisation through differences in endowments or technologies across countries and regions. The main prediction is that for given endowment and/or productivity differences across countries or regions, intensified integration leads to a reallocation of production and increases specialisation according to comparative advantage: higher income countries/regions specialise in capital intensive, technology, skill and research intensive industries while lower income countries specialise in labour intensive industries. Convergence of endowments and productivities (expected in a single market with perfect labour mobility) combined with constant returns to scale will lead to decreasing specialisation.

In a world with increasing returns to scale and imperfect (monopolistic) competition, traditional trade theory does not explain all patterns of trade and specialisation. The new trade theory models (Krugman, 1979; Panagarija, 1980, 1981, 1986; Markusen and Melvin, 1981, Ethier, 1981, Helpman and Krugman, 1985) point out the geographical advantage of large regions or regions with good market access: these regions are particularly attractive for location of industrial activity. According to these theoretical models, high income countries/regions specialise on industries with high levels of product and process innovations driven by forces on the demand side (new products and greater variety) and the supply side (innovation rents and the capacity to make use of technological opportunities). Locations and countries with optimal market access may profit first and stronger from economic integration. In the presence of transport costs,

industries for which increasing returns to scale are important will locate near the largest market. As trade cost become smaller, industries move to peripheral regions to take advantage of the lower prices of production factors.

The central element of the new economic geography is the presence of pecuniary or technological externalities summarised in terms of backward and forward linkages (Krugman, 1980; Krugman and Venables, 1990; Krugman, 1991a,b; Brülhart, 1995; Krugman and Venables, 1995; Puga, 1998; Venables, 1996; Amiti, 1998; Venables, 1998; Puga, 1999; Ricci, 1999). Through agglomeration economies, the spatial concentration of economic activity can become self-reinforcing: the periphery specialises in low wage industries and mature products, in industries with less product diffeentiation and limited spill overs. If factor prices rise faster in the center, if diseconomies of agglomeration emerge and if economic integration is low, making the cost difference between the core and the periphery more decisive, the process of agglomeration may reverse.

The new economic growth extends the accumulation of capital to knowledge, human and public capital and points out to the endogeneous development of technological progress as the engine of growth (Romer, 1990; Grossman and Helpman, 1991; Aghion and Howitt, 1992). In line with these arguments, government policy can positively influence the long-run growth through economic incentives for the accumulation of various forms of capital and through a context which is more conducive to innovation.

Empirical testing of these latter models is still at an early stage. The most interesting analyses still focus on special cases. In particular, the bulk of the existing empirical literature is devoted to the North American Free Trade Agreement (NAFTA) and the European Union.

A rigorous and complete assessment of the locational forces identified by these models mentioned is provided by the work of Hanson on US-Mexican integration. He finds support for the hypothesis that agglomeration is associated with increasing returns, and shows that integration with the US has shifted Mexican industry away from Mexico city and towards states with good access to the US market. This is reflected in the falling importance of distance from the capital and the rising importance of distance from the border in explaining interregional wage differentials (Hanson, 1997a, 1997b, 1998). A similar movement towards the border states can be observed in the US.

Hanson (1996) argues that border regions are the natural laboratories in which to identify any relocation effects of integration, and that border cities are the best units of analysis. He finds that integration not only has shifted industry towards border cities both in the US and in Mexico, but also that it has made demand and cost linkages more important determinants of industrial location: employment has grown more in those regions that have larger agglomerations of industries with buyer/supplier relationships.

With respect to Europe, Brülhart (1996) and Brülhart and Torestensson (1996) study the evolution of industrial specialisation patterns in 11 EU countries (all except Luxemburg and the more recent member states: Austria, Finland and Sweden) between 1980 and 1990. They find support for some of the main implications of theoretical models. More recently, Fischer and Nijkamp (1999) examine spatial economic implications of the European integration.

First, Brülhart (1996) finds that between 1980 and 1990 14 of the 18 industries considered have become more geographically concentrated in Europe (as measured by Gini coefficients). Second, sectors characterised by large economies of scale have shown larger increases in concentration. Finally, Brülhart and Torstensson (1996) find some support for the U-shaped relationship between the degree of regional integration and spatial agglomeration predicted by the models when labour mobility is low: activities with larger scale economies were more concentrated in regions close to the geographical core of the EU during the early stages of European integration, while concentration in the core has fallen in the 1980s.

Using production data in current prices for 27 manufacturing industries Amiti (1997) finds that there was a significant increase of specialisation between 1968 and 1990 in Belgium, Denmark, Germany, Greece, Italy, and the Netherlands; no significant change in Portugal; a significant fall in specialisation in France, Spain and the UK. There was a significant increase in specialisation between 1980 and 1990 in all countries.

With more disaggregate data (65 industries) the increase in specialisation is more pronounced: the average increase is 2 percent for all countries except Italy compared to 1 percent in the case with 27 manufacturing industries

Other evidence of increasing specialisation in EU countries in the 1980s is provided by Hine (1990) and Greenway and Hine (1991).

Sapir (1996) finds that specialisation did not increase in EU countries from 1977 to 1992 using an Herfindahl index with export data. This is an indicator of "absolute

specialisation" since it measures how different the distribution of exports shares is from a uniform distribution

On the front of geographic concentration, Amity (1998) finds that 17 out of 27 industries experienced an increase in geographical concentration with an average increase of 3 per cent per year in leather products, transport equipment and textiles. Only six industries experienced a fall in concentration, with paper and paper products and "other chemicals" showing particularly marked increases in dispersion. Brulhart and Torstensson (1996): find a positive correlation between scale economies and industry bias towards the central EU in both 1980 and 1990. Similar results are provided in Brulhart (1998).

A number of recent papers look at the effects of trade policy on agglomeration (Brülhart and Torstensson (1996), Martin and Ottaviano (1996), Ottaviano (1996), Puga and Venables (1997) and Walz (1997). On the policy front, Trionfetti (1997) looks at the consequences for industrial location of different procurement policies. A common idea in these papers is that the design of trade agreements and of infrastructure networks shapes the location advantage in terms of access to world markets. This is applied by Puga (1997) to discuss the implications of the new economic geography for European regional policy.

With respect to accession countries, existing evidence based on trade statistics suggests that these countries tend to specialise in labour and resource intensive sectors following an inter-industry trade pattern (Landesmann, 1995). In spite the dominance of inter-industry (Hecksher-Ohlin) type of trade, intra-industry trade has also increased, more evident for the Czech Republic and Hungary (Landesmann, 1995, Dobrinsky, 1995). This increase however, may be associated to the intensification of outward processing traffic.

Most of the research on regional issues in transition economies has focused on patterns of disparities with the aim to identify policy needs at regional level (for instance Spiridonova 1995, 1999 - for Bulgaria, Nemes-Nagy, 1994, 1998 - for Hungary , Constantin, 1997 - for Romania). It has been claimed that the processes of internationalisation and structural change in transition economies tend to favour metropolitan and western regions, as well as regions with a strong industrial base (Petrakos, 1996). In addition, at the macro-geographical level the process of transition will increase disparities at the European level, by favouring countries near the East-

West frontier (Petrakos, 1999). Increasing core-periphery differences in Estonia are documented in Raagmaa (1996). Regional determinants of new private firms in Romania are investigated in Traistaru (1999). Using the approach of the "new economic geography", Altomonte and Resmini (1999) investigate the role of foreign direct investment in shaping regional specialisation in accession countries.

This paper brings empirical evidence about the impact of economic integration with the EU on patterns and changes in regional specialisation and geographical concentration of industrial activity in Romania during the period 1991-1999. The remainder of this paper is organised as follows. Section 1 explains the data and measurement issues. Section 2 analyses regional specialisation patterns. Section 3 discusses location and concentration of industrial activity. Section 4 examines the relationships between regional specialisation and growth. Section 5 concludes.

1   Data and measurement

This research uses a special created data base, REGSTAT_RO including regional indicators at NUTS II and NUTS III levels for the period 1991-1999.The data has been provided by the National Institute for Statistics.

We use employment data for 13 manufacturing industries, 8 NUTS II regions and 41 NUTS III regions respectively. Data on GDP is available only at the NUTS II level for the period 1993-1998.Unemployment is registered unemployment.

Regional specialisation and geographic concentration of industries are defined in relation to production structures[1]. Regional specialisation is defined as the distribution of the shares of an industry i in total manufacturing in a specific region j compared to a norm. A region j is found to be specialised in a specific industry i if this industry has a high share in the manufacturing employment of region j. The manufacturing structure of a region j is "highly specialised" if a small number of industries have a large combined share in the total manufacturing.

Geographic concentration measures the distribution of the shares of regions in a specific industry i. A specific industry i is said to be "concentrated" if a large part of production is carried out in a small number of regions.

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[1] see Aiginger, K. et al. (1999) for a survey of theoretical and empirical literature on regional specialisation and geographic concentration of industries

Specialisation and concentration could be assessed using absolute and relative measures. There are several indicators proposed in the existing literature each offering certain advantages as well as shortcomings. For our analysis, we have selected a an absolute measure (the Herfindahl index) and a relative measure (the dissimilarity index proposed by Krugman). The content and methodology related to these indicators is presented in Box 1.1.

Box 1.1   Indicators of regional specialisation and geographic concentration of industries[2]

E = employment
s = shares
i = industry (sector, branch)
j = region

s_{ij}^{S} = the share of employment in industry i in region j in total employment of region j

s_{ij}^{C} = the share of employment in industry i in region j in total employment of industry i

s_{i} = the share of total employment in industry i in total employment

s_{j} = the share of total employment in region j in total employment

$$s_{ij}^{S} = \frac{Eij}{Ej} = \frac{Eij}{\sum_{i} Eij}$$

$$s_{ij}^{C} = \frac{Eij}{Ei} = \frac{Eij}{\sum_{j} Eij}$$

$$s_{i} = \frac{Ei}{E} = \frac{\sum_{j} Eij}{\sum_{i}\sum_{j} Eij}$$

$$s_{j} = \frac{Ej}{E} = \frac{\sum_{i} Eij}{\sum_{i}\sum_{j} Eij}$$

The Herfindahl index

Regional specialisation measure

$$H_{j}^{S} = \sum_{i} (s_{ij}^{S})^{2}$$

Geographic concentration measure

$$H_{i}^{C} = \sum_{j} (s_{ij}^{C})^{2}$$

The disimilarity (Krugman) index

Specialisation measure

$$DSR_{j} = \sum_{i} \left| s_{ij}^{S} - s_{i} \right|$$

Concentration measure

$$DCR_{i} = \sum_{j} | s_{ij}^{C} - s_{j} |$$

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[2] indicators are defined following Aiginger, K. et al. (1999)

3   Regional specialisation patterns

3.1   The regional structure of Romania

With a territory of 238391 km^2, and a population of 22455.5 thousand inhabitants (at January 1st 2000), Romania is a middle-sized country.

Romania is divided into 41 counties (*judet*, corresponding to NUTS III level) and the municipality of Bucharest. Each unit has its own local government, as do cities, towns, and *communes* (rural areas), within each county.

With the law 151/1998 on regional development in Romania, there have been created 8 Development Regions, corresponding to the NUTS II statistical level (see Appendix A4). These regions, have been established through voluntary co-operation of the counties, do not have legal status and are not territorial-administrative units.

The territorial-administrative structure of Romania includes 263 towns (of which 84 municipalities) and 2688 communes (over 13 thousand villages are grouped in these communes). The towns / communes correspond to NUTS level IV.

More than half of Romania's towns (152 from 263) have less than 20000 inhabitants and only 23 towns have a population exceeding 100000 inhabitants. Bucharest has more than 2 million inhabitants. Urban population represents 54.8% of total population. Table 3.1 shows the main geographic and demographic characteristics of the NUTS II regions in Romania.

Table 3.1   Geographic and demographic characteristics of Development Regions (NUTS II), Romania, 2000

Region	NUTS III components	Area km^2	Population (thousands)
ROMANIA	42 (Including Bucharest)	238,391	22,456
1. North-East	Bacau, Botosani, Iasi, Neamt, Suceava, Vaslui	36,850	3,810
2. South-East	Braila, Buzau, Constanta, Galati, Tulcea, Vrancea	35,762	2,940
3. South	Arges, Calarasi, Dâmbovita, Giurgiu, Ialomita, Prahova, Teleorman	34,453	3,480
4. South-West	Dolj, Gorj, Mehedinti, Olt, Vâlcea	29,212	2,410
5. West	Arad, Caras-Severin, Hunedoara, Timis	32,034	2,040
6. North-West	Bihor, Bistrita-Nasaud, Cluj, Maramures, Satu-Mare, Salaj	34,159	2,850
7. Centre	Alba, Brasov, Covasna, Harghita, Mures, Sibiu	34,100	2,645
8. Bucharest Ilfov	Bucuresti, Ilfov	1,821	2,281

Source: The National Commission for Statistics, 1999, the National Agency for Regional Development, 1999, and the Institute for Economic Forecasting, 2000.

Table 3.2 shows the GDP per capita in the eight NUTS II regions compared to the national and the EU-15 average for GDP per capita in 1999. The regions with GDP per capita above the national average are Bucharest (142 per cent), West (115 per cent) and South East (104 per cent). The poorest region is North - East with only 76 per cent of the national GDP per capita. Compared to the EU-15 GDP per capita, the richest region, Bucharest, has 38 per cent while the poorest region, North-East has oly 21 per cent.

Table 3.2   Regional GDP per capita disparities, Romania 1999

Region	Romanian average GDP per capita = 100%	EU-15 average GDP per capita = 100%
ROMANIA	100	27
1. North-East	76	21
2. South-East	104	28
3. South	93	25
4. South-West	98	26
5. West	115	31
6. North-West	90	24
7. Centre	103	28
8. Bucuresti-Ilfov	142	38

Source: National Institute for Statistics

In Romania, regional disparities have historical, geographical, cultural and economic roots. These disparities, especially the economic ones, have expanded during transition because, on the one hand, of substantial economic fall (at the end of 1999 GDP reached only 75% of its 1989 level), and, on the other hand, of the firms' behaviour in an economic environment with very high and long term inflation. In the same economic environment, resources will be orientated to regions that offer the opportunity for a rapid profit growth, and a rapid investment recapture (Jula, D. and N.Jula, 1998).

Moreover, the transition reveals the economic weakness of poorly developed areas: the strong dependence on a single industry, poor town planning and low localities attractiveness, insufficient utilities infrastructure development a.s.o. The regions with dominant rural areas are the poorest. They are strongly dependent on agriculture and lack a young and adult population (as in past decades they migrated to urban areas).

Beginning with 1997, the unemployment rate went up due to the acceleration of the restructuring process in mining, chemical, petro-chemical sectors and new legislation on compensatory payments.

Over time, some areas became deprived zones, with a high unemployment concentration. These are in monoindustrial localities, with a development level below the national average and lack of job opportunities. Thus, the unemployment rate is far above the national average rate in the north-eastern and south-eastern counties, as for instance in Hunedoara, Gorj, Valcea.

From this point of view, rural areas are more affected than urban areas.

Significant disparities exist, however, within each Development Region. For example in the Centre Development Region, Bra°ov and Sibiu counties are significantly more urbanised and wealthier than the other four counties in the Region.

3. 2   Specialized and diversified regions

Table A1 shows the regional structure of manufacturing in Romania in 1991 and 1999 for the 8 NUTS II regions. The highest share of manufacturing is concentrated in the Centre. In 1990 the combined share of the four regions with the highest shares in manufacturing (Centre, South, North-East, Bucharest) was 57.52 per cent. The region Centre has gained 2.06 percentage points in 1999 compared with 1990 while Bucharest has lost 2.19 percentage points. In 1999, the combined share of the four regions with the highest shares in manufacturing was 60.16 per cent suggesting a tendency for concentration.

The specialisation of regions at the NUTS II level is low as shown in Tables A2 and A3. The highest absolute regional specialisation in 1991 is found for Bucharest, North-East, West and South-East. Compared to 1991, in 1999 the South -West replaces the West region in the group of regions with the highest absolute specialisation (Table A4). The relative specialisation is the highest in South-East and North-East (Table A5). In the period 1991-1999, the absolute specialisation has decreased in six of the 8 regions while the relative specialisation has increased in 5 regions (see table A6 and Fig 1 and 2). Both absolute and relative specialisation have increased in South-East and North-West and have decreased in South-West, Centre and Bucharest.

Table A7 shows the regional structure of manufacturing in 1991 and 1999 at NUTS III level. The regions with the highest shares in manufacturing include: Bucharest, Brasov, Prahova, Arges, Cluj, Timis, Cluj. Compared with 1991, in 1999 the regional shares of manufacturing have declined most in Bucharest (2.92 percentage points), Prahova (0.53 percentage points), Dambovita (0.46 percentage points), Neamt (0.30 percentage points) and Suceava (0.24 percentage points). The highest increase of regional share in manufacturing in 1999 compared to 1991 has occurred in Arges (1.37 percentage points).

The regions with highest specialisation include: Ialomita, Botosani, Caras-Severin, Salaj, Vaslui, Dambovita, Galati, Alba. The most diversified regions include: Iasi, Bihor, Tulcea, Bistrita-Nasaud, Bucharest, Sibiu, Neamt, Timis (see Tables A8 and A9).

At the NUTS III level, the regions have higher values for the absolute and relative indicators of regional specialisation. The analysis of absolute and relative specialisation shown in tables A8-A10 suggests the following patterns of regional specialisation:

High and increasing specialisation	High and decreasing specialisation
Ialomita, Valcea, Gorj, Calarasi	Caras-Severin, Salaj, Botosani, Dambovita, Brasov, Covasna
Diversified and increasing specialisation	**Diversified and decreasing specialisation**
Bihor, Teleorman, Dolj, Buzau, Bistrita-Nasaud, Neamt, Timis	Iasi, Bucharest, Sibiu

3.3 How similar/different are regional industrial structures?

In the above analysis we compared the regional industrial (manufacturing) structures with the national structure and identified specialized and diversified regions. In a similar way, we can compare the industrial structures of pairs of regions and assess how similar/different are regional industrial structures. The smaller the measure of bilateral differences the more similar the production structures of the two regions are.

The measures of bilateral differences between the industrial structures of pairs of regions at NUTS II level for 1991 and 1999 are shown in Table 3.3 . The bold figures indicate the most different regions and the bold italics the most similar ones.

Table 3.3

Bilateral Krugman specialisation indices - NUTS II, Romania 1991

	North-East	South-East	South	South-West	West	North-West	Central	Bucharest-Ilfov
North-East	0,0000	**0,4776**	0,4680	**0,4818**	0,4641	0,4226	0,4069	**0,6079**
South-East	0,4776	0,0000	0,1940	0,2757	0,3031	0,3914	0,2582	0,4244
South	0,4680	0,1940	0,0000	0,2927	0,3355	0,4517	0,2294	0,4055
South-West	0,4818	*0,2757*	0,2927	0,0000	0,4483	**0,4722**	0,2646	**0,5431**
West	0,4641	0,3031	0,3355	0,4483	0,0000	0,3261	0,3351	0,2594
North-West	0,4226	0,3914	0,4517	0,4722	0,3261	0,0000	0,3077	0,4557
Central	0,4069	*0,2582*	*0,2294*	*0,2646*	0,3351	0,3077	0,0000	0,4206
Bucharest-Ilfov	0,6079	0,4244	0,4055	0,5431	*0,2594*	0,4557	0,4206	0,0000

Bilateral Krugman specialisation indices - NUTS II, Romania 1999

	North-East	South-East	South	South-West	West	North-West	Central	Bucharest-Ilfov
North-East	0,0000	**0,5965**	**0,6144**	0,5363	**0,5564**	0,3552	0,3921	**0,5553**
South-East	0,5965	0,0000	0,3302	0,4196	0,3295	0,4983	0,3124	0,4698
South	0,6144	0,3302	0,0000	0,2160	0,4138	**0,6566**	0,3528	0,4209
South-West	0,5363	0,4196	*0,2160*	0,0000	0,5029	**0,5519**	0,3975	0,4311
West	0,5564	*0,3295*	0,4138	0,5029	0,0000	0,3641	0,2489	0,3247
North-West	0,3552	0,4983	0,6566	0,5519	0,3641	0,0000	0,3288	0,4574
Central	0,3921	*0,3124*	0,3528	0,3975	*0,2489*	0,3288	0,0000	0,3486
Bucharest-Ilfov	0,5553	0,4698	0,4209	0,4311	*0,3247*	0,4574	0,3486	0,0000

In the period 1991-1999 the bilateral differences have increased in 42 cases of the total of 56 pairs of regions.

The production (manufacturing) structure in North East appears the most different compared to the other regions and the bilateral differences have increased in four of the seven pairs of North-East with the other regions. The Centre region seem to have similar production structures with South, South-East and South-West. The West region is most similar to Bucharest and Centre and has converged with Center while diverging from Bucharest.

4 Location and concentration of industrial activity

4.1 The manufacturing structure in Romania

Table A11 shows the manufacturing structure in Romania in 1991 and 1999. In 1991 the three industries with the highest shares in manufacturing were: textiles and wearing apparel (19.79 per cent), machinery and equipment (18.27 per cent), metallurgy and metal products (11.18 per cent). Their combined share in manufacturing was 49.24 per cent. In 1999, the three industries with the highest shares in manufacturing were textiles and apparel (20.56 per cent), metallurgy and metal products (11.18 per cent), food, beverages and tobacco (11.51 per cent). The combined share in manufacturing of the three industries with the highest shares was lower in 1999 43.78 per cent. The most significant changes in the manufacturing structure in 1999 compared to 1991 were the increase of the share of Food, beverages and tobacco (3.53 percentage points) and the decline of the share of machinery and equipment (7.28 percentage points).

4.2 Patterns of geographic concentration of manufacturing

Tables A12-A14 show absolute and relative concentration measures for manufacturing in Romania for the years 1991 and 1999. Our research results suggest an increasing geographical concentration of industries in seven out of the thirteen manufacturing branches. The five most concentrated industries include: Motor vehicles and transport equipment; Electrical machinery; paper and paper products; Fuels, chemicals and chemical products; rubber and plastic products. The five least concentrated industries are: Food, beverages and tobacco; Furniture and other manufacture goods, Metallurgy and metal products; wood and wood products.

4.3 Spatial separation of manufacturing

The indices of geographical concentration used in the above analysis show to what extent each industry is concentrated in few regions. To understand factors driving the location of industrial (manufacturing) activity one would be interested to know in addition whether these (few) regions are close or distant from each other. Midelfart-Knarvik (2000) proposes an index of spatial separation which takes into account the distances between locations. The spatial separation index of industry j (SP^j) is defined as follows:

$$SP^j = C \sum_{k=1}^{n} \sum_{l=1}^{n} \left(s_{kj}^c s_{lj}^c \boldsymbol{d}_{kl} \right)$$

where $\boldsymbol{d}_{kl}$ is a measure of distance between two regions k and l, and C is a constant. SP^j can be interpreted as the weighted average of all bilateral distances between pairs of locations of an industry j, weighted by production shares s_{kj}^c and s_{lj}^c. The index is zero if industrial production is concentrated in a single location. The higher the value of the index, the more spatially separated is the production.

Figue 1 shows the evolution of the spatial separation index for manufacturing at NUTS III level in the period 1991-1999. The spatial separation index indicates a U-shaped evolution between 1991-1996 with a minimum in 1994. Spatial separation increased between 1997-1998 and has slightly decreased in 1999 compared to 1997.

Table 4.1 shows the spatial separation index calculated for the NACE two-digit industries at NUTS III level in Romania. The five most spatially separated industries are: Food, beverages and tobacco; Textile and textile products; Furniture and other manufacturing goods; Wood and wood products; Leather and footwear. The five least spatially separated are machinery and equipment; Fuels, chemicals and chemical products; Paper and paper products; Rubber and rubber products.

The results obtained with the spatial separation index confirm the results we found with the indices of geographical concentration. Most concentrated industries are also the least spatially separated while the least concentrated industries are those most spatially separated.

Figure 1   Spatial Separation index, NUTS III, Romania 1991 - 1999

Table 4.1 **Spatial separation indices for manufacturing branches, Romania,**

4 Does greater specialisation imply greater polarisation?

4.1 Location and re-location patterns of industrial activity

Table 4.1 shows regional manufacturing shares in Romania in the period 1991-1999. Manufacturing appears to be evenly distributed across the eight regions. The regions with the biggest shares in 1991 are Centre, South, North-East and Bucharest while the South-West and West regions had the lowest shares.

Table 4.1 indicates location and re-location patterns of manufacturing in Romania in the period 1991- 1999. The biggest structural change has occurred in the capital region and the Centre region. Manufacturing seems to move away from Bucharest to the Centre region. This change is mainly explained by the increasing shift to services in Bucharest. The North-West region (western border regions) has increased its share in manufacturing with 1.38 percentage points while the South-West region (mining and heavy industry) has lost 1.45 percentage points and the West region 1.10 percentage points respectively.

Population mobility might contribute to avoiding polarisation.

Table 4.1   Ratio of regional manufacturing shares and total population shares

Region	1991	1992	1993	1994	1995	1996	1997	1998	1999
North-East	0.87	0.85	0.82	0.81	0.82	0.80	0.81	0.79	0.82
South-East	0.81	0.79	0.80	0.80	0.81	0.78	0.78	0.77	0.80
South	0.95	1.01	1.02	1.02	1.03	1.03	1.03	1.03	1.00
South-West	0.90	0.85	0.84	0.84	0.87	0.87	0.88	0.88	0.88
West	1.08	1.09	1.09	1.09	1.14	1.11	1.11	1.03	1.03
North-West	0.96	1.00	1.02	1.02	1.01	1.01	1.01	1.01	1.04
Centre	1.23	1.29	1.33	1.33	1.32	1.37	1.36	1.36	1.46
Bucharest	1.33	1.23	1.18	1.18	1.12	1.11	1.11	1.11	1.02

Values close to 1 indicate an even spread of manufacturing across population. The ratio values increase for South, West, and North-West suggesting that these regions are preferred destinations for relocation while North-East, South-East and Bucharest seem to be losing regions in terms of population and manufacturing.

4.2 Specialisation, unemployment and economic growth

A policy relevant question related to specialisation is whether greater specialisation implies greater polarisation. The table below compares the values of coefficients of variation for GDP and GDP per capita for the period 1993-1998 at the regional level (NUTS II). This comparison suggests that regional GDP has a greater concentration than the regional GDP per capita indicating that greater concentration of GDP is matched by greater concentration of population. However, degree of concentration of the GDP has remained almost the same the period 1993-1998 while the concentration of the GDP per capita has increased suggesting a tendency towards income polarisation.

Table 4.2   Dispersion of GDP and GDP per capita in Romania, 1993-1998

Year	GDP	GDP per capita
1993	1,3162	0,1607
1994	1,3151	0,1939
1995	1,3145	0,1571
1996	1,3150	0,1785
1997	1,3142	0,1770
1998	1,3170	0,2413

We have investigated the relationship between absolute and relative specialisation respectively and GDP and unemployment. Tables 5.3 and 5.4 report the regression results using a panel data for 8 regions at NUTS II level for the period 1993-1998. The first model is an estimation using levels while the second model is an estimated log-log model of the following functional form:

$$\text{SPEC}_{jt} = a_0 + b_1 GDP + b_2 UNE + b_3 \sum_j R + b_4 \sum_t T + e_{jt}$$

SPEC = the specialisation measure: HjS in the case of absolute specialisation,

DSRj in the case of relative specialisation; GDP = regional GDP per capita

UNE = the unemployment rate; R = regional dummies (Bucharest is the omitted region)

T = time dummies   (1993 is chosen as benchmark)

e_{jt} = the error term

Table 4.3   Absolute specialisation, GDP and unemployment

	(1)	(2)
GDP	0.0004	0.2434
	(0.0002)	(0.1460)
UNE	0.0021*	0.1454*
	(0.0011)	(0.0793)
Regional dummies	Yes	Yes
Year dummies	Yes	Yes
Constant	0.0612**	-2.0067*
	(0.0292)	(0.6007)
Adjusted R²	0.29	0.32
N	48	48

* significant at 10 % level, ** significant at 5% level
Numbers in parentheses are standard errors

Table 5.4   Relative specialisation, GDP and unemployment

	(1)	(2)
GDP	-0.0003	-0.8729
	(0.0005)	(0.56213)
UNE	-0.0995***	-0.18320***
	(0.0189)	(0.0305)
Regional dummies	Yes	Yes
Year dummies	Yes	Yes
Constant	1.7407**	4.6414**
	(0.4844)	(2.3134)
Adjusted R²	0.39	0.46
N	48	48

* significant at 10 % level, ** significant at 5% level
Numbers in parentheses are standard errors

Our empirical analysis has produced different results for absolute and relative specialisation measures. On average and other things being equal, absolute specialisation seems to be positively and significantly related to regional unemployment but there is no relationship to the GDP per capita. The log- log model provides a better estimation. Our results suggest that a 1% increase of the regional unemployment rate results in an 14% increase of the Herfindahl index measuring regional specialisation. This result suggests that regions with high specialisation have experienced industrial restructuring.

On the other hand, relative regional specialisation is found to be significantly and negatively related to the unemployment rate. The results of the log-log model suggest that on average and other things being equal an 1% increase of the unemployment rate

reduces the relative specialisation with 18%. This result seems to be consistent with the shift from industrial employment to services.

5 Conclusions

At the NUTS II level a low degree of specialisation is found. The highest regional specialisaton is found for Bucharest, North-East, South West and South and the lowest in the Centre, West and North West. In the period 1991-1999 regional specialisation has increased in South East and North-East and while Bucharest, Centre and South West have become more diversified. At the NUTS III level, the regions have higher values for the absolute and relative indicators of regional specialisation. We have found the following patterns of regional specialisation have been identified: regions with the highest and increasing specialisation: Ialomita, Valcea, Gorj, Calarasi; regions with the highest specialisation and decreasing: Caras-Severin, Salaj, Botosani, Dambovita, Brasov, Covasna; Diversified regions with increasing specialisation: Bihor, Teleorman, Dolj, Buzau, Bistrita-Nasaud, Neamt, Timis; diversified regions with increasing diversification: Iasi, Bucharest, Sibiu.

Our research results suggest an increasing geographical concentration of industries in seven out of the thirteen manufacturing branches. The five most concentrated industries include: Motor vehicles and transport equipment; Electrical machinery; paper and paper products; Fuels, chemicals and chemical products; rubber and plastic products. The five least concentrated industries are: Food, beverages and tobacco; Furniture and other manufacture good, Metallurgy and metal products; wood and wood products.

We find a greater concentration of regional GDP compared to the regional GDP per capita. This result suggest that greater concentration of GDP is matched by greater concentration of population. However, the degree of concentration of the GDP has remained almost the same in the period 1993-1998 while the concentration of the GDP per capita has increased indicating a tendency towards income polarisation.

Our empirical analysis of the relationship between regional specialisation, economic growth and unemployment produced contradictory results. On the one hand we find a negative relationship between absolute regional specialisation and regional GDP and unemployment rates. On the other hand, relative specialisation seems to be negatively related to regional GDP and unemployment.

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Table A1   **Regional structure of manufacturing, Romania, 1991 and 1999, NUTS II, in %**

NUTS Regions	s_j1991	s_j 1999	Change
North-East	14,20	14,63	0,43
South-East	10,48	11,24	0,77
South	14,72	14,83	0,11
South-West	9,54	8,09	-1,45
West	10,18	9,08	-1,10
North-West	12,28	13,66	1,38
Centre	14,97	17,04	2,06
Bucharest	13,63	11,44	-2,19
Total	100,00	100,00	

Table A2   **The Herfindahl index for specialisation (H_j^S), 1991-99, Romania, NUTS II**

Regions NUTS II	1991	1992	1993	1994	1995	1996	1997	1998	1999
North-East	0,142611	0,133295	0,134263	0,128096	0,131830	0,130638	0,127726	0,130714	0,142227
South-East	0,124392	0,131364	0,134181	0,138561	0,143030	0,148076	0,141873	0,150430	0,150435
South	0,122017	0,129949	0,122838	0,123605	0,117740	0,114844	0,113084	0,112905	0,114630
South-West	0,119081	0,105714	0,103738	0,101508	0,103389	0,103035	0,104525	0,106177	0,108498
West	0,129698	0,125952	0,126384	0,120522	0,119538	0,118808	0,117025	0,119102	0,115900
North-West	0,119283	0,115089	0,115485	0,108664	0,111087	0,112907	0,109269	0,116578	0,122627
Centre	0,119746	0,118920	0,121954	0,121793	0,114693	0,117516	0,103282	0,109469	0,111622
Bucharest	0,135289	0,113534	0,105327	0,103906	0,102885	0,100573	0,098884	0,103022	0,101972

Table A3   **The Krugman specialisation index (DSR_j), Romania 1991-1999, NUTS II**

Regions NUTS II	1991	1992	1993	1994	1995	1996	1997	1998	1999
North-East	0,305315	0,366248	0,388570	0,381791	0,395606	0,3813808	0,367156	0,309827	0,333119
South-East	0,257164	0,339972	0,366024	0,379359	0,417071	0,406564	0,396057	0,433762	0,368924
South	0,149839	0,298063	0,310742	0,346975	0,338134	0,3500886	0,362043	0,342660	0,273497
South-West	0,294148	0,248053	0,204657	0,231048	0,188960	0,2239353	0,258911	0,223366	0,285444
West	0,195953	0,221028	0,247572	0,254041	0,247437	0,2466008	0,245765	0,250737	0,243697
North-West	0,246158	0,319438	0,335275	0,322756	0,317584	0,3204663	0,323349	0,319595	0,263081
Centre	0,183200	0,193126	0,209855	0,208953	0,207884	0,1941782	0,180473	0,163262	0,166691
Bucharest	0,376010	0,355767	0,371375	0,321863	0,329341	0,3017094	0,274078	0,300089	0,275449

Table A4 Regional specialisation in Romania, 1991, NUTS II

NUTS II Regions	H_j^S 1991	Rank	DSR_j	Rank
North-East	0,142611	1	0,305315	2
South-East	0,124392	4	0,257164	4
South	0,122017	5	0,149839	8
South-West	0,119081	8	0,294148	3
West	0,129698	3	0,195953	6
North-West	0,119283	7	0,246158	5
Centre	0,119746	6	0,183200	7
Bucharest	0,135289	2	0,376010	1

Table A5 Regional specialisation in Romania, 1999, NUTS II

NUTS II Regions	H_j^S 1999	Rank	DSR_j 1999	Rank
North-East	0,1422	2	0,3331	2
South-East	0,1504	1	0,3689	1
South	0,1146	5	0,2735	5
South-West	0,1085	7	0,2854	3
West	0,1159	4	0,2437	7
North-West	0,1226	3	0,2631	6
Centre	0,1116	6	0,1667	8
Bucharest	0,1020	8	0,2754	4

Table A6 Changes in patterns of regional specialisation, Romania 1991-99, NUTS II

NUTS II Regions	H_j^S 1991	H_j^S 1999	Change	DSR_j 1991	DSR_j 1999	Change
North-East	0,142611	0,142227	d	0,305315	0,333119	i
South-East	0,124392	0,150435	i	0,257164	0,368924	i
South	0,122017	0,114630	d	0,149839	0,273497	i
South-West	0,119081	0,108498	d	0,294148	0,285444	d
West	0,129698	0,115900	d	0,195953	0,243697	i
North-West	0,119283	0,122627	i	0,246158	0,263081	i
Centre	0,119746	0,111622	d	0,183200	0,166691	d
Bucharest	0,135289	0,101972	d	0,376010	0,275449	d

Table A7   Regional structure of manufacturing in Romania, 1991 and 1999, NUTS III

NUTS III Regions	s_j1991	Rank	s_j1999	Rank	Change
Bacau	3,01	10	3,08	10	0,07
Botosani	1,51	29	1,47	31	-0,04
Iasi	3,20	7	3,42	8	0,22
Neamt	2,79	12	2,49	14	-0,30
Suceava	2,55	15	2,31	16	-0,24
Vaslui	1,79	24	1,85	24	0,07
Braila	1,64	27	1,62	28	-0,02
Buzau	2,22	17	1,95	20	-0,27
Constanta	2,05	19	1,91	23	-0,14
Galati	2,86	11	3,51	7	0,66
Tulcea	0,82	39	0,89	38	0,07
Vrancea	1,25	32	1,37	33	0,12
Arges	3,74	5	5,11	3	1,37
Calarasi	0,94	37	0,84	39	-0,10
Dambovita	2,76	13	2,30	17	-0,46
Giurgiu	0,53	41	0,45	41	-0,08
Ialomita	0,63	40	0,55	40	-0,08
Prahova	4,74	3	4,21	4	-0,53
Teleorman	1,43	30	1,38	32	-0,05
Dolj	2,65	14	2,50	13	-0,15
Gorj	1,10	34	0,96	37	-0,13
Mehedinti	0,92	38	1,13	36	0,21
Olt	1,74	25	1,72	27	-0,02
Valcea	1,52	28	1,78	25	0,26
Arad	1,98	21	2,11	19	0,13
Caras-Severin	1,39	31	1,53	30	0,14
Hunedoara	2,03	20	1,92	22	-0,11
Timis	3,41	6	3,52	6	0,11
Bihor	2,53	16	3,00	12	0,47
Bistrita-Nasaud	1,13	33	1,19	35	0,06
Cluj	4,22	4	4,05	5	-0,17
Maramures	1,80	23	2,11	18	0,31
Satu Mare	1,81	22	1,75	26	-0,07
Salaj	0,98	36	1,56	29	0,58
Alba	2,10	18	2,33	15	0,23
Brasov	4,96	2	5,13	2	0,17
Covasna	1,06	35	1,28	34	0,22
Harghita	1,74	26	1,93	21	0,19
Mures	3,02	9	3,02	11	0,00
Sibiu	3,12	8	3,34	9	0,22
Mun. Bucuresti (including Ilfov)	14,36	1	11,44	1	-2,92
Total	100,00		100,00		

Table A8   Regional specialisation in Romania, 1991, NUTS III

NUTS III Regions	H_j^S	Rank	DSR_j	Rank
Bacau	0,132229	35	0,539469	23
Botosani	0,267752	2	0,763619	5
Iasi	0,147921	27	0,348335	41
Neamt	0,125	38	0,431188	34
Suceava	0,178013	15	0,686769	11
Vaslui	0,219384	5	0,565131	21
Braila	0,141406	29	0,500335	27
Buzau	0,070401	41	0,459323	32
Constanta	0,126679	37	0,525896	24
Galati	0,208617	7	0,680286	12
Tulcea	0,161495	22	0,62603	14
Vrancea	0,178225	14	0,500426	26
Arges	0,16717	19	0,569007	20
Calarasi	0,184089	11	0,710226	8
Dambovita	0,214963	6	0,741506	6
Giurgiu	0,181895	12	0,646819	13
Ialomita	0,269558	1	0,921054	1
Prahova	0,169163	18	0,578142	18
Teleorman	0,1482	26	0,394073	39
Dolj	0,135839	32	0,427523	35
Gorj	0,169383	17	0,705513	9
Mehedinti	0,154361	24	0,506587	25
Olt	0,164723	20	0,622628	15
Valcea	0,156371	23	0,778401	4
Arad	0,145621	28	0,467462	31
Caras-Severin	0,266937	3	0,915196	2
Hunedoara	0,187277	10	0,587691	17
Timis	0,135292	33	0,445646	33
Bihor	0,129626	36	0,357501	40
Bistrita-Nasaud	0,140752	31	0,394148	38
Cluj	0,111061	40	0,477573	29
Maramures	0,164706	21	0,548487	22
Satu Mare	0,179491	13	0,473293	30
Salaj	0,242224	4	0,907734	3
Alba	0,204334	8	0,574915	19
Brasov	0,188641	9	0,700537	10
Covasna	0,150315	25	0,724977	7
Harghita	0,171626	16	0,618808	16
Mures	0,116052	39	0,484195	28
Sibiu	0,141193	30	0,396728	36
Mun. Bucuresti (including Ilfov)	0,135289	34	0,396461	37

Table A9   Regional specialisation in Romania, 1999, NUTS III

NUTS III Regions	H_j^S	Rank	DSR_j	Rank
Bacau	0,172751	19	0,598304	25
Botosani	0,195729	10	0,64544	20
Iasi	0,145526	33	0,327868	40
Neamt	0,124247	38	0,444117	38
Suceava	0,148163	31	0,704313	13
Vaslui	0,264466	5	0,727561	8
Braila	0,174952	17	0,576165	28
Buzau	0,157174	27	0,534074	34
Constanta	0,152045	29	0,660168	19
Galati	0,290045	3	0,844054	4
Tulcea	0,216292	7	0,683399	17
Vrancea	0,30786	1	0,712584	12
Arges	0,187455	12	0,716112	10
Calarasi	0,277752	4	0,764833	6
Dambovita	0,168921	21	0,732718	7
Giurgiu	0,205016	9	0,691644	14
Ialomita	0,295854	2	0,950466	1
Prahova	0,160101	25	0,714851	11
Teleorman	0,165778	22	0,549594	32
Dolj	0,145678	32	0,573733	30
Gorj	0,17167	20	0,864616	2
Mehedinti	0,141739	34	0,676243	18
Olt	0,178701	15	0,585977	27
Valcea	0,165171	24	0,857322	3
Arad	0,150017	30	0,448329	37
Caras-Severin	0,212886	8	0,807722	5
Hunedoara	0,174638	18	0,587063	26
Timis	0,132813	36	0,532844	35
Bihor	0,165508	23	0,626324	22
Bistrita-Nasaud	0,121057	39	0,575143	29
Cluj	0,114068	40	0,47028	36
Maramures	0,177732	16	0,550596	31
Satu Mare	0,183585	14	0,625462	23
Salaj	0,192972	11	0,689453	15
Alba	0,153568	28	0,62501	24
Brasov	0,158131	26	0,626656	21
Covasna	0,186293	13	0,687909	16
Harghita	0,231369	6	0,725442	9
Mures	0,127376	37	0,547187	33
Sibiu	0,139152	35	0,353792	39
Mun. Bucuresti (including Ilfov)	0,101972	41	0,282847	41

Table A10 **Changes in patterns of regional specialisation, Romania, 1991-99, NUTS III**

NUTS III Regions	DSRj1991	DSRj1999	Change	H_j^S 1991	H_j^S 1999	Change
Bacau	0,539469	0,598304	i	0,132229	0,172751	i
Botosani	0,763619	0,64544	d	0,267752	0,195729	d
Iasi	0,348335	0,327868	d	0,147921	0,145526	d
Neamt	0,431188	0,444117	i	0,125	0,124247	d
Suceava	0,686769	0,704313	i	0,178013	0,148163	d
Vaslui	0,565131	0,727561	i	0,219384	0,264466	i
Braila	0,500335	0,576165	i	0,141406	0,174952	i
Buzau	0,459323	0,534074	i	0,070401	0,157174	i
Constanta	0,525896	0,660168	i	0,126679	0,152045	i
Galati	0,680286	0,844054	i	0,208617	0,290045	i
Tulcea	0,62603	0,683399	i	0,161495	0,216292	i
Vrancea	0,500426	0,712584	i	0,178225	0,30786	i
Arges	0,569007	0,716112	i	0,16717	0,187455	i
Calarasi	0,710226	0,764833	i	0,184089	0,277752	i
Dambovita	0,741506	0,732718	d	0,214963	0,168921	d
Giurgiu	0,646819	0,691644	i	0,181895	0,205016	i
Ialomita	0,921054	0,950466	i	0,269558	0,295854	i
Prahova	0,578142	0,714851	i	0,169163	0,160101	d
Teleorman	0,394073	0,549594	i	0,1482	0,165778	i
Dolj	0,427523	0,573733	i	0,135839	0,145678	i
Gorj	0,705513	0,864616	i	0,169383	0,17167	i
Mehedinti	0,506587	0,676243	i	0,154361	0,141739	d
Olt	0,622628	0,585977	i	0,164723	0,178701	i
Valcea	0,778401	0,857322	i	0,156371	0,165171	i
Arad	0,467462	0,448329	d	0,145621	0,150017	i
Caras-Severin	0,915196	0,807722	d	0,266937	0,212886	d
Hunedoara	0,587691	0,587063	d	0,187277	0,174638	d
Timis	0,445646	0,532844	i	0,135292	0,132813	d
Bihor	0,357501	0,626324	i	0,129626	0,165508	i
Bistrita-Nasaud	0,394148	0,575143	i	0,140752	0,121057	d
Cluj	0,477573	0,47028	d	0,111061	0,114068	i
Maramures	0,548487	0,550596	i	0,164706	0,177732	i
Satu Mare	0,473293	0,625462	i	0,179491	0,183585	i
Salaj	0,907734	0,689453	d	0,242224	0,192972	d
Alba	0,574915	0,62501	i	0,204334	0,153568	d
Brasov	0,700537	0,626656	d	0,188641	0,158131	d
Covasna	0,724977	0,687909	d	0,150315	0,186293	i
Harghita	0,618808	0,725442	i	0,171626	0,231369	i
Mures	0,484195	0,547187	i	0,116052	0,127376	i
Sibiu	0,396728	0,353792	d	0,141193	0,139152	d
Mun. Bucuresti (including Ilfov)	0,396461	0,282847	d	0,135289	0,101972	d

Table A11   The manufacturing structure in Romania, 1991 and 1999, in %

Industries	1991	1999	Change
Food, beverages and tobacco	7,98	11,51	3,53
Textiles and wearing apparel	19,79	20,56	0,77
Tanning and dressing of leather, footwear	3,87	4,60	0,73
Wood and wood products	2,74	4,57	1,83
Paper and paper products	1,93	2,30	0,37
Fuels, chemicals and chemical products	6,02	6,44	0,42
Rubber and plastic products	2,37	2,11	-0,26
Other non-metallic products	5,91	5,52	-0,39
Metallurgy and metal products	11,18	11,71	0,54
Machinery and equipment	18,27	10,99	-7,28
Electrical machinery	5,76	4,40	-1,35
Motor vehicles and transport equipment	8,22	8,81	0,59
Furniture and other manufactured goods	5,98	6,47	0,50

Table A12   Concentration of manufacturing, Romania, 1991

Industries	H_i^C 1991	Rank	DCR_i 1991	Rank
Food, beverages and tobacco	0,034408	13	0,313732	13
Textiles and wearing apparel	0,037772	12	0,333558	12
Tanning and dressing of leather, footwear	0,077672	3	0,656876	6
Wood and wood products	0,04509	10	0,692003	5
Paper and paper products	0,109227	2	0,828138	3
Fuels, chemicals and chemical products	0,05849	7	0,732729	4
Rubber and plastic products	0,071259	5	0,619168	8
Other non-metallic products	0,053447	8	0,477695	10
Metallurgy and metal products	0,049521	9	0,50196	9
Machinery and equipment	0,067766	6	0,434446	11
Electrical machinery	0,179281	1	0,870806	2
Motor vehicles and transport equipment	0,077424	4	0,914282	1
Furniture and other manufactured goods	0,041073	11	0,619884	7

Table A13   Concentration of manufacturing in Romania, 1999

Industries	H_i^C1999	Rank	DCR_i1999	Rank
Food, beverages and tobacco	0,038215	12	0,619424	13
Textiles and wearing apparel	0,036513	13	0,670447	12
Tanning and dressing of leather, footwear	0,080031	5	1,178521	3
Wood and wood products	0,049613	10	0,933841	9
Paper and paper products	0,087489	3	1,029469	6
Fuels, chemicals and chemical products	0,065882	6	1,175499	4
Rubber and plastic products	0,080107	4	1,071849	5
Other non-metallic products	0,053619	9	0,945183	8
Metallurgy and metal products	0,057217	8	0,931956	10
Machinery and equipment	0,060611	7	0,962022	7
Electrical machinery	0,122738	1	1,342792	1
Motor vehicles and transport equipment	0,09058	2	1,217353	2
Furniture and other manufactured goods	0,042336	11	0,825127	11

Table A14   Changes in concentration of manufacturing, Romania, 1991-1999

Industries	HiC1991	HiC1999	Change	DCRi1991	DCRi1999	Change
Food, beverages and tobacco	0,034408	0,038215	i	0,313732	0,619424	i
Textiles and wearing apparel	0,037772	0,036513	d	0,333558	0,670447	i
Tanning and dressing of leather, footwear	0,077672	0,080031	i	0,656876	1,178521	d
Wood and wood products	0,04509	0,049613	i	0,692003	0,933841	i
Paper and paper products	0,109227	0,087489	d	0,828138	1,029469	i
Fuels, chemicals and chemical products	0,05849	0,065882	i	0,732729	1,175499	d
Rubber and plastic products	0,071259	0,080107	i	0,619168	1,071849	d
Other non-metallic products	0,053447	0,053619	i	0,477695	0,945183	i
Metallurgy and metal products	0,049521	0,057217	i	0,50196	0,931956	i
Machinery and equipment	0,067766	0,060611	d	0,434446	0,962022	i
Electrical machinery	0,179281	0,122738	i	0,870806	1,342792	i
Motor vehicles and transport equipment	0,077424	0,09058	i	0,914282	1,217353	i
Furniture and other manufactured goods	0,041073	0,042336	i	0,619884	0,825127	i