THE EMERGING ECONOMIC GEOGRAPHY IN SLOVENIA

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1 Introduction

In the beginning of the 1990s, transition countries opened up and reoriented their trade flows towards the European Union (EU). According to EG theory, extensive trade liberalization with the EU should lead to inter-regional relocation of manufacturing activities towards western border regions. The aim of the present paper is to analyze the pattern of regional relocation of manufacturing in Slovenia after trade liberalization with the EU. We first provide an in-depth analysis of the regional structure of manufacturing in Slovenia and its relocation pattern after trade with the EU had been opened up. In addition, we test some of the predictions of the second EG approach for Slovenia. The econometric tests follow the reasoning of the Damijan and Kostevc (2002) model. We assume the following inter-regional adjustment mechanism after trade liberalization has begun to take place. The relocation of factors of production might be, for reasons besides those of market access, driven by extensive FDI inflows from EU countries directed either to existing economic centers or to EU border regions (western and northern regions). Depending on the size of existing economic centers and on inter-regional trade costs, trade liberalization aggravated by FDI inflows may, therefore, either enhance or dampen the existing agglomeration effects. Increasing or decreasing differences in relative regional wages may then reverse the agglomeration/deglomeration processes. As a consequence, an (inverted) U-shaped curve of relative regional wages and manufacturing output with respect to the inter-regional trade costs (distance) in the home country might occur in the long run. More specifically, in the first stage of trade liberalization a divergence (convergence) in relative wages and output is probable, but afterwards it might turn into convergence (divergence). In any case, a non-monotonic relationship between the reduction of foreign trade costs and relative regional wages is expected in the long run. In this paper we therefore analyze the effects of trade liberalization on the regional pattern of FDI inflows, relocation of manufacturing and inter-regional adjustment of relative wages in Slovenia.

The structure of this paper is as follows. In the second section we discuss the evolution of the economic integration of Slovenia with the European Union. The third and fourth sections discuss the patterns of regional specialization and industrial concentration, respectively. Section 5 deals with the regional specialization, polarization and unemployment issue. The effect of economic geography on the relocation pattern of manufacturing output, FDI and wages is tested in section 6. The final section provides some conclusions in the analysis.

2 Evidence on Increasing Integration with the EU

2.1 Trade liberalization and trade performance

After the break-up of former Yugoslavia in 1991 and the subsequent loss of most of the domestic market, Slovenia embarked on an intensive drive to reorient its trade. Slovenia followed a diversified pattern of trade liberalization. In addition to the Co-operation and Europe Agreements with the EU, Slovenia was rapidly entering into free trade agreements (FTAs) with EFTA and CEFTA member states as well as with other European countries. Thus, up to the present day, Slovenia has signed FTAs with 32 European countries, which accounted for 86 per cent of the total Slovenian foreign trade in 2000. Keeping in mind that Slovenia is also a member of the WTO, it is clear that Slovenian foreign trade is almost completely liberalized. This can be seen also in the average import duties, which have been lowered to 2.3 per cent in 1999 for manufacturing goods in general and to 1.8% for imports from the EU.

Table 8.1: The role of the EU in Slovenia's foreign trade in 1992-2000 (in mill. EUR)

Year	Ex-Total	Ex-EU15	EU share	Im-Total	Im-EU15	EU share	EU Ex/Im
1992	5168	3145	60.8%	4751	2831	59.6%	111.1%
1993	5208	3293	63.2%	5565	3651	65.6%	90.2%
1994	5772	3419	59.2%	6175	3523	57.1%	97.0%
1995	6437	4315	67.0%	7347	5056	68.8%	85.3%
1996	6636	4286	64.6%	7524	5079	67.5%	84.4%
1997	7408	4709	63.6%	8291	5588	67.4%	84.3%
1998	8072	5288	65.5%	9018	6259	69.4%	84.5%
1999	8023	5304	66.1%	9345	6412	68.6%	82.7%
2000	9483	6060	63.9%	10986	7446	67.8%	81.4%

Source: Statistical Office of the Republic of Slovenia (SURS).

Table 8.1 demonstrates that the EU is Slovenia's most important trading partner, with a 64 per cent share of exports and 68 per cent share of imports in 2000. Except for with Germany, which is Slovenia's largest individual trading partner (about 30 per cent of exports), Slovenia's trade with the EU is characterized by large trade deficits. The trend towards trade deficit is worsening, as the trade coverage ratio has deteriorated to 81 per cent in 2000. Obviously, this might indicate a deterioration of the competitiveness of Slovenia's exports in the EU markets.

In fact, Table 8.2 reveals that in three out of the four largest exporting industries (transport equipment, machinery and electrical and optical equipment), which represent 57 per cent of total exports in 1999, the indices of revealed comparative advantage (RCA) have declined over the period from 1992 to 1999. There are only two industries that recorded increased RCA indices in 1999 as compared to 1992. Table 8.2 also indicates a shift away from comparative advantage and towards an increased intra-industry trade pattern in Slovenia's trade with the EU during 1990s. However, a study by Freudenberg (1998) shows that the vast majority of Slovenia's intra-industry trade (as well as of other advanced CEECs) with the EU is clustered in down-market products characterized by average prices that are more than 15 per cent below the EU average.

Table 8.2: Pattern of Slovenia's comparative advantage and intra-industry trade with the EU in 1992-1999

Code	Industry	RCA92[a]	RCA99[a]	IIT92[b]	IIT99[b]	%EX92	%EX99
A	**AGRIC., HUNTING AND FORESTRY**	2.99	0.62	56.19	28.65	1.66	0.51
B	**FISHING**	1.69	0.11	69.65	16.38	0.02	0.01
CA	**MINING AND QUAR. OF EN.-PROD.**	–	0.00	0.57	0.00	1.37	0.00
CB	**MINING AND QUAR. EX. EN. PROD.**	0.56	0.08	19.28	10.94	0.11	0.03
DM	**Transport equipment**	1.63	1.06	69.48	87.85	16.35	18.81
DK	**Machinery and equipment**	2.65	2.31	47.14	60.47	10.92	14.97
DJ	**Basic metals and fab. metal products**	1.19	1.28	68.51	71.19	10.38	12.57
DL	**Electrical and optical equipment**	1.52	1.21	57.60	63.88	8.15	11.04
DB	**Textiles and textile products**	1.84	1.47	64.74	73.45	18.78	9.78
DN	**Furniture and other manuf. Products**	7.60	5.12	45.45	43.66	5.70	9.04
DG	**Chemicals, ch. prod., fibers**	0.32	0.62	45.47	42.62	3.63	4.87
DD	**Wood and wood products**	31.00	7.67	27.70	47.65	5.11	4.15
DH	**Rubber and plastic products**	4.15	1.42	45.20	60.40	3.66	4.06
DE	**Pulp, paper, publishing and printing**	2.44	1.18	54.05	80.99	4.55	3.77
DI	**Other non-metallic mineral products**	10.36	1.79	40.07	48.97	2.63	2.94
DA	**Food, beverages and tobacco**	2.67	0.84	50.29	37.58	2.62	1.77
DC	**Leather and leather products**	1.66	1.00	70.77	72.30	3.71	1.66
DF	**Coke, ref. Petrol. prod., nuclear fuel**	0.16	0.01	29.84	2.28	0.65	0.05

[a] Balassa index of revealed comparative advantage, calculated as: $RCA_i = x_{iSLO}/X_{SLO} / x_{iEU}/X_{EU}$, i.e., share of exports of product *i* in total Slovenia's exports relative to share of exports of product *i* in total extra EU exports.

[b] Grubel-Lloyd index of intra-industry trade, calculated as: $IIT_i = (1 - (|x_i - m_i| / (x_i + m_i))) * 100$; where x_i and m_i refer to exports and imports of product *i*.

Note: Both indices were calculated using HS 6-digit trade data (some 5,500 items) and then aggregated to NACE 2-digit sectors.

Source: SURS, authors' calculations.

The most important issue, therefore, is how to increase the export competitiveness of Slovenia's products in EU markets. One way to do this is to induce the productivity growth of existing exporters, while another way is to create new export products through the attraction of foreign direct investments (FDI).

2.2 Foreign direct investment

Compared to other advanced CEECs, Slovenia has not been very successful in attracting FDI during the 1990s. As shown in Table 8.3 the total stock of FDI at the end of 2000 amounts to some 3 billion USD, which is, with the exception of Estonia, clearly below the figures presented by the other first round candidates for EU enlargement. With a 13 per cent share of total stock of FDI in GDP, the poor importance of FDI in Slovenia is even more pronounced. A main reason for the low presence of FDI in Slovenia is no doubt the method of privatization of formerly socially owned firms chosen by Slovenian government. The law on privatization completely excluded foreign bidders and favored domestic insiders.

In 2002, the Slovenian government plans to sell the two biggest banks, which are state owned, to strategic foreign partners. Hence, in 2002, the inflow of FDI will be huge. However, one should not forget that none of the above acquisitions is allocated to the manufacturing sector and hence no impact on the export potential of Slovenia's economy can be expected.

Table 8.3: Stock of FDI in first-round candidates for EU enlargement in 2000

Country	Inflow (mill.USD)	Stock (mill.USD)	Stock of FDI as % GDP (%)	Inflow per capita (USD)	Stock per capita (USD)
Czech Rep.	4,595	21,095	33.0	460	2110
Estonia	398	2,840	47.9	249	1775
Hungary	1,957	19,863	39.9	190	1928
Poland	10,000	36,475	17.2	261	952
Slovenia	181	2,865	13.0	91	1447
Total	17,131	83,138	21.4	276	1337

Source: World Investment Report 2001.

A comparative study of the role of FDI in ten transition countries, undertaken by Damijan et al. (2001) using firm-level data, has shown that foreign-owned firms perform better in terms of total factor productivity (TFP) growth in almost all transition countries including Slovenia. This indicates that knowledge, in the form of transfer of technology, transfer of managerial skills, use of intangible assets of the parent firm and more efficient corporate governance, has been successfully transferred to local firms. In addition, for Slovenia, imports of intermediate and capital goods as well as exports of final goods to the EU have been revealed as an important channel for technology transfer in firms without foreign participation.

3 Regional Specialization patterns

In this chapter we discuss the evolution of regional specialization in the 1990s in Slovenia. We use a database on manufacturing activity at the regional NUTS-3 level, which is indicated as an unofficial database, and which covers the period from 1994 to 2000. As the data for the first period of transition (1990-1993) are missing, we are unlikely to be able to uncover the whole process of changes in the regional specialization pattern caused by integration with the EU. Nevertheless, important shifts in the relocation of manufacturing activities between regions can also be discovered for the second part of the transition in Slovenia.

3.1 Pattern of Regional Manufacturing Activity

3.1.1. Distribution of regions by population size

Using population data, four large regions with a population share exceeding 10 per cent of the total population of Slovenia can be identified (see Table 8.4). These are: **Osrednjeslovenska**, containing the Slovenian capital Ljubljana, followed by **Podravska,** with the capital of Maribor, **Savinjska,** with the capital of Celje and **Gorenjska** with the capital of Kranj. An additional four regions can be classified as medium-sized, with a population share exceeding 5 per cent: **Dolenjska** with the capital of Novo mesto, **Pomurska** with the capital of Murska sobota, **Goriška** with the capital of Nova Gorica and **Obalno-kraška** with the capital of Koper. Four small regions are: **Koroška** with the capital of Slovenj Gradec, **Spodnjeposavska** with the capital of Krško, **Notranjsko-kraška** with the capital of Postojna and **Zasavska** with the capital of Hrastnik.

Table 8.4: Distribution of NUTS-3 regions by size in Slovenia in 2000

Size rank	Region	Share in geographic area (%)	Population share (%)
1	**Osrednjeslovenska**	12.6	24.5
2	**Podravska**	10.7	16.1
3	**Savinjska**	11.8	12.9
4	**Gorenjska**	10.5	9.9
5	**Dolenjska**	13.2	6.9
6	**Pomurska**	6.6	6.3
7	**Goriška**	11.5	6.0
8	**Obalno-kraška**	5.1	5.2
9	**Koroška**	5.1	3.7
10	**Spodnjeposavska**	4.4	3.5
11	**Notranjsko-kraška**	7.2	2.5
12	**Zasavska**	1.3	2.3

Source: SURS.

3.1.2. Regional GDP per capita disparities

Unfortunately, the most recent available official data on GDP per capita at the regional level is for 1997, which makes the analysis somewhat cumbersome. Regional GDP per capita data in Table 8.5 reveal that the central Osrednjeslovenska and the Obalno-Kraška regions exceed the country's average per capita GDP. But only the former substantially surpasses the average, by 33 percent, while the latter's GDP per capita is only marginally higher than the average. The relatively high GDP per capita of the Osrednjeslovenska region, coupled with its share of the population, make it the largest contributor to the average per capita GDP. GDP per capita levels for another four regions (Goriška, Savinjska, Dolenjska and Gorenjska) reach 90 percent of the Slovene average. The rest of the regions can be classified into a third group with per capita GDP levels not surpassing 90 percent of the average. The poorest region with respect to per capita GDP is the Pomurska region, where only 77 percent of the average per capita GDP has been reached.

In 1997, the Osrednjeslovenska region reached 62 percent of the European Union average, but none of the other regions' per capita GDP s has surpassed 50 percent of the EU average. The poorest region's GDP is only 36.6 percent of the European Union average. However, note that official data for 2001 indicate that the average Slovene per capita GDP is about 78 per cent of the EU average. According to this figure, the Osrednjeslovenska region in 2001 should have already exceeded the EU average, while the other regions should be in the range of 60-80 per cent of the EU average.

Table 8.5: Distribution of NUTS-3 regions by GDP per capita in Slovenia in 1997

Region	Percent of country average	Percent of EU-15 average
Osrednjeslovenska	132.3	62.3
Obalno-kraška	103	48.5
Goriška	98.8	46.5
Savinjska	93.9	44.3
Dolenjska	92.8	43.7
Gorenjska	92.7	43.7
Koroška	86.9	40.9
Spodnjeposavska	86.5	40.8
Notranjsko-kraška	85.6	40.3
Podravska	82.5	38.9
Zasavska	82.4	38.8
Pomurska	77.6	36.6

Source: SURS.

3.1.3. Relocation patterns of manufacturing activity

The distribution of economic activity across regions does not completely follow the distribution of regions by population size. Reasons for this are (i) the initial regional specialization pattern and (ii) changes in the regional specialization pattern due to economic integration with the EU. If regional manufacturing employment, output and exports are related to regional population structure, one can identify regions with over- (under-) proportional manufacturing intensity. Values of corresponding coefficients close to one indicate an even spread of manufacturing across regions. Changes in coefficients over time imply the relocation of manufacturing activity. Shifts of coefficients closer to one imply increased similarity and shifts of coefficients away from one imply increased regional specialization.

Table 8.6: Distribution of economic activity across regions in Slovenia in 1994-2000 (in %)

No.	Region	EMP94	EMP00	PROD94	PROD00	EX94	EX00
6	**Dolenjska**	8.6	10.6	12.9	17.1	17.3	22.5
9	**Podravska**	12.2	11.6	11.7	12.4	10.3	12.8
4	**Goriška**	7.2	8.2	6.3	7.2	6.1	7.5
10	**Koroška**	3.2	4.8	3.5	6.5	4.3	7.6
1	**Osrednjeslovenska**	22.2	21.8	25.0	24.2	19.3	19.2
8	**Notranjsko-kraška**	2.3	2.3	2.0	1.7	2.5	1.7
12	**Zasavska**	2.7	2.5	1.8	1.7	1.6	1.2
3	**Gorenjska**	15.2	13.5	13.1	10.7	15.2	10.8
5	**Savinjska**	12.7	12.8	12.3	10.9	13.1	10.3
7	**Pomurska**	7.6	6.9	5.4	3.3	4.6	2.8
2	**Obalno-kraška**	2.9	2.7	4.1	2.9	3.8	2.4
11	**Spodnjeposavska**	3.1	2.3	1.8	1.4	1.8	1.2

EMP – employment share, PROD – manufacturing output share, EX – exports share.

Source: SURS, authors' calculations.

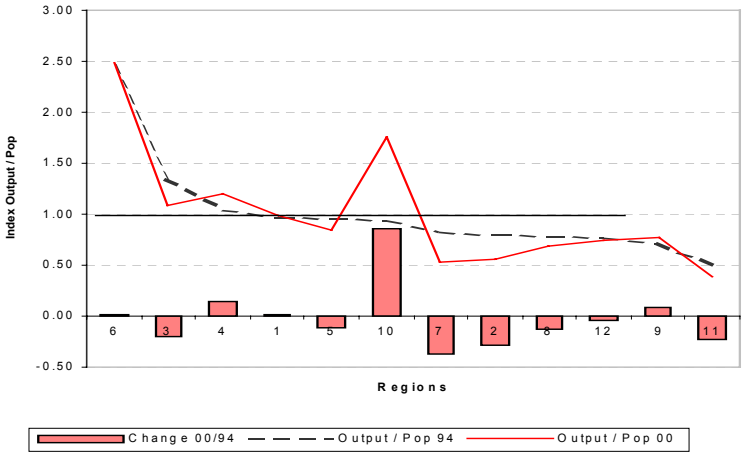
Location and relocation patterns of manufacturing activity are presented in Table 8.6 and Figure 8.1. Peaks above one in Figure 8.1 represent the regions Gorenjska, Goriška, Dolenjska, Pomurska and Zasavska, which are characterized by an over-proportional amount of manufacturing activity relative to population share. After 1994, there were evident shifts in manufacturing activities. Some of the regions have benefited from the process of integration with the EU and increased specialization, while the position of other regions has deteriorated somewhat. It is interesting to note that the largest gains in this process have been achieved by the regions with an initial over-proportion of manufacturing activity and that only one of the regions with initially under-proportional manufacturing activity has gained in terms of manufacturing relocation. The results imply that initial production structures may play an important role in determining future patterns of production.

However, not all of the regions with initially over-proportional manufacturing intensity have benefited from integration with the EU. Only three out of the five regions with over-proportional amounts of manufacturing activity have actually benefited through relocation of production. The largest gain from the accession process has been achieved by the Dolenjska region, with a population share of only 6.9%, which witnessed an increase in the share of manufacturing output from 12.9% in 1994 to 17.1% in 2000. This was made possible by the extraordinary export performance of firms in the region, resulting in a 22.5% share in total of Slovenia's exports (a rise from 17.3% in 1994). Reasons for the region's favorable development can be found primarily in FDI as Renault's subsidiary alone accounts for some 10% of total Slovenian exports (and 40% of the regional performance). This performance has been supported by the achievements of domestic firms in the pharmaceutical industry, electrical equipment, transport equipment, etc. Gains from production relocation have also been observed in the Goriška and Koroška regions, where production shares have risen by 0.9 and 3 percentage points, respectively. The two regions have also increased their shares in employment and exports, while the

Podravska region has managed to increase both production and export shares despite a fall in the share of employment (from 12.2% in 1994 to 11.6% in 2000).

Regions where major declines in shares have been observed are, on the other hand, the Gorenjska, Savinjska, Pomurska, Obalno-kraška and Spodnjeposavska regions, which have lost their shares in manufacturing employment and output. The Savinjska region, the Gorenjska region and the Pomurska region are still characterized by above average manufacturing intensity in terms of employment. Their position, however, has been rapidly deteriorating over time. Both remaining regions faced below average manufacturing intensities at the beginning of the observed period and their relative manufacturing positions continued to worsen throughout the period. Hence, a trend of de-industrialization in regions that are already less manufacturing-intensive, on one hand, and a trend of increased manufacturing concentration in regions that were initially more manufacturing-intensive, on the other hand, can be observed. Initial production patterns seem to be very important for future regional specialization in Slovenia. The only exception that can be observed is the Koroška region, which experienced an increase in the shares of employment, production and exports despite the low initial shares in manufacturing production. The largest, Osrednjeslovenska region, as well as the Notranjsko-Kraška and Zasavska regions have not experienced substantial changes in their shares in total manufacturing employment, with the latter two experiencing declines in production and export shares.

Figure 8.1: Relocation of manufacturing activity between regions in Slovenia from 1994-2000 (Index Output / Population share)



An important qualification should be made of the above analysis. One should bear in mind that the above analysis is focused solely on manufacturing activity. Some of the regions that have experienced deterioration of manufacturing activity (i.e., the Obalno-kraška region, etc.) have, in fact, restructured their economic activity towards service industries (tourism, transport, telecommunications, merchandise, etc.). Therefore, despite the relative decline in manufacturing activity some of the regions have experienced substantial catch-up in terms of per capita GDP.

3.2 Changes in regional specialization in manufacturing

In the previous section we discovered important shifts in the relocation of manufacturing activities between regions during the 1990s. In this section it remains to be seen whether these inter-regional shifts were associated with increased regional specialization. In order to save space, in the first subsection regional specialization is analyzed, mostly according to manufacturing employment data. In the second subsection we compare evidence of the regional specialization of manufacturing employment with the data for manufacturing output and exports.

3.2.1. Regional concentration of manufacturing employment

First, we show measures of absolute regional specialization as represented by the Herfindahl index. The calculated indices summarized in Table 8.7 show relatively low regional specialization for Slovenia. The average value of Herfindahl indices across the regions is about 0.15,[1] which is relatively low compared to other transition economies. The lowest level of regional specialization is observed in the largest regions (Osrednjeslovenska and Podravska), while the greatest specialization is observed in the smallest regions (Spodnjeposavska and Zasavska) and in the Pomurska region. Manufacturing activity in these small regions is mostly concentrated in three or four sectors, in which firms located in these regions can enjoy a comparative advantage over firms in other regions.

Table 8.7: Evolution of Herfindahl indices of absolute regional specialization of manufacturing employment in Slovenia from 1994-2000

Size rank	Region	1994	1995	1996	1997	1998	1999	2000	Ratio 00/94
1	**Osrednjeslovenska**	0.10	0.10	0.10	0.10	0.10	0.11	0.11	1.1
2	**Podravska**	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.8
3	**Savinjska**	0.14	0.13	0.12	0.11	0.11	0.12	0.12	0.9
4	**Gorenjska**	0.13	0.13	0.13	0.14	0.14	0.14	0.15	1.2
5	**Dolenjska**	0.15	0.15	0.14	0.13	0.13	0.12	0.12	0.8
6	**Pomurska**	0.22	0.23	0.25	0.26	0.31	0.32	0.34	1.5
7	**Goriška**	0.16	0.16	0.16	0.17	0.17	0.18	0.19	1.2
8	**Obalno-kraška**	0.14	0.15	0.14	0.14	0.15	0.14	0.16	1.1
9	**Koroška**	0.03	0.19	0.19	0.19	0.17	0.17	0.18	6.0
10	**Spodnjeposavska**	0.19	0.22	0.23	0.24	0.23	0.21	0.21	1.1
11	**Notranjsko-kraška**	0.21	0.20	0.20	0.20	0.20	0.23	0.23	1.1
12	**Zasavska**	0.23	0.24	0.26	0.24	0.24	0.25	0.24	1.0

Herfindahl index: $H_j^S = \sum_i (s_{ij}^S)^2$, where S_{ij}^S is share of employment in industry *i* in region *j* in total employment of region *j*.

Source: SURS, authors' calculations.

The evolution of Herfindahl indices over the period 1994-2000 reveals that economic integration has stimulated regional specialization most in the small and backward regions like the Koroška, Spodnjeposavska and Pomurska regions. Regional specialization is most evident in the Pomurska region, where the Herfindahl index has risen from 0.22 in 1994 to 0.34 in 2000. Other regions, with the possible exception of Koroška, have not experienced such pronounced changes in their Herfindahl index. Obviously, economic integration with the EU has created even greater specialization in the already specialized smaller regions.

In contrast to the Herfindahl index of absolute specialization, relative measures of regional specialization, such as Balassa index, compare regional concentrations of manufacturing activity to the national pattern of manufacturing concentration. In other words, relative regional specialization measures search for differences in the patterns of concentration of manufacturing activity between the regional and national levels. Hence, a Balassa index value for region *j* greater than one indicates that the manufacturing concentration in this region is greater than at the national level.

Table 8.8 reveals a different pattern of regional specialization than those based on measures of absolute regional specialization. Regional specialization is now being observed to some extent in larger regions like Osrednjeslovenska, Podravska and Dolenjska, while in some smaller regions like Koroška, Spodnjeposavska, Obalno-kraška and Notranjsko-kraška, a less distinctive pattern of regional specialization can be observed. On the other hand, in only five out of the 12 regions is there evidence of

[1] A maximum value of the Herfindahl index (1) indicates perfect specialization, while the lowest value (0) indicates no specialization.

increased regional specialization from 1994 to 2000. Hence, based on this evidence one cannot make any inferences about increasing regional specialization over the period.

Table 8.8: Evolution of Balassa indices of relative regional specialization of manufacturing employment in Slovenia from 1994-2000

Size rank	Region	1994	1995	1996	1997	1998	1999	2000	Ratio 00/94
1	**Osrednjeslovenska**	0.95	0.95	0.96	0.97	1.08	1.09	1.09	1.1
2	**Podravska**	0.92	0.92	0.92	0.94	1.28	1.29	1.31	1.4
3	**Savinjska**	0.87	0.89	0.89	0.91	0.90	0.90	0.90	1.0
4	**Gorenjska**	1.01	1.04	1.03	0.98	0.97	0.94	0.92	0.9
5	**Dolenjska**	1.00	0.98	1.01	1.01	1.01	1.04	1.08	1.1
6	**Pomurska**	1.63	1.76	1.73	1.64	1.78	1.77	1.77	1.1
7	**Goriška**	0.87	0.86	0.86	0.86	0.84	0.81	0.79	0.9
8	**Obalno-kraška**	1.12	1.06	1.09	1.07	1.03	1.09	0.91	0.8
9	**Koroška**	0.95	0.84	0.83	0.85	0.89	0.91	0.96	1.0
10	**Spodnjeposavska**	0.83	0.83	0.83	0.81	0.80	0.81	0.85	1.0
11	**Notranjsko-kraška**	1.08	1.06	1.06	1.04	1.06	1.12	1.10	1.0
12	**Zasavska**	0.94	0.95	0.91	0.94	0.94	1.15	1.12	1.2

Balassa index: $RS_j = \frac{1}{I}\sum_i RS_{ij}$, where $RS_{ij} = \frac{s_{ij}^S}{s_i}$, where s_{ij}^S is share of employment in industry *i* in region *j* in total employment of region *j*, and s_i is share of total employment in industry *i* in total employment and *I* is the number of industries.

Source: SURS, authors' calculations.

Similar conclusions can be drawn based upon the calculated dissimilarity indices presented in Table 8.9. Evidence of increased regional specialization over the period is found in four regions. However, changes observed at the regional level are far from dramatic.

Evidence from the dissimilarity index shows some increase in specialization in the Osrednjeslovenska, Pomurska and Koroška regions, while de-specialization can be observed in the Gorenjska, Savinjska, Dolenjska, Podravska and Spodnjeposavska regions. No viable conclusions can therefore be drawn about the effects of economic integration on regional specialization from the above indices.

Table 8.9: Evolution of dissimilarity indices of regional specialization of manufacturing employment in Slovenia from 1994-2000

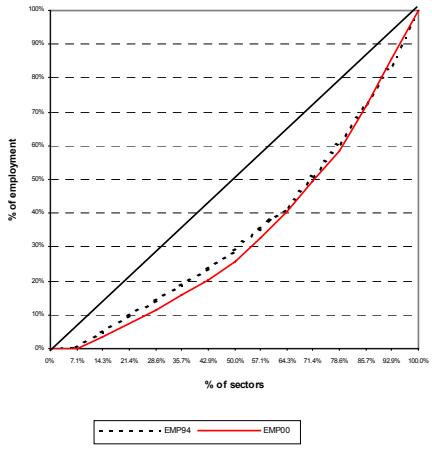
Size rank	Region	1994	1995	1996	1997	1998	1999	2000	Ratio 00/94
1	**Osrednjeslovenska**	0.34	0.37	0.43	0.45	0.46	0.47	0.47	1.4
2	**Podravska**	1.78	1.82	1.47	1.36	1.42	1.29	1.29	0.7
3	**Savinjska**	0.80	0.74	0.65	0.54	0.61	0.34	0.34	0.4
4	**Gorenjska**	1.71	1.75	1.79	1.69	1.59	1.51	1.50	0.9
5	**Dolenjska**	2.28	2.50	2.57	2.42	2.35	1.90	1.92	0.8
6	**Pomurska**	1.50	1.55	1.62	1.77	1.78	1.81	1.85	1.2
7	**Goriška**	2.26	2.64	2.75	2.65	2.67	1.81	1.80	0.8
8	**Obalno-kraška**	1.00	0.75	0.73	0.72	0.75	0.79	0.75	0.8
9	**Koroška**	0.78	0.92	0.95	0.97	0.99	0.83	0.93	1.2
10	**Spodnjeposavska**	2.20	2.16	2.31	2.05	1.92	1.65	1.72	0.8
11	**Notranjsko-kraška**	1.27	1.21	1.31	1.33	1.30	1.21	1.20	0.9
12	**Zasavska**	0.98	1.01	1.06	1.03	1.02	1.07	1.00	1.0

Dissimilarity index: $DSR_j = \sum_i \left| s_{ij}^S - s_i \right|$, where s_{ij}^S is share of employment in industry i in region j in total employment of region j, and s_i is share of total employment in industry i in total employment.

Source: SURS, authors' calculations.

The last piece of evidence about the pattern of regional specialization will be shown using Lorenz curves. Lorenz curves show, in a very instructive way, whether or not one variable is concentrated. The larger the share of the largest regions in some variable across sectors, the more Lorenz curve will shift away from the diagonal. Figure 8.2 reveals, again, that manufacturing employment in Slovenia is relatively regionally concentrated. However, there is little evidence of increased regional specialization in manufacturing employment over the period of 1994-2000.

Figure 8.2: Lorenz curve of regional concentration of manufacturing employment in Slovenia from 1994-2000



3.2.2. Regional concentration of manufacturing output and exports

One of the reasons for the lack of evidence of increased regional specialization in manufacturing employment data might be the fact that employment structures are always very rigid and respond only reluctantly to changes in patterns of manufacturing output. Hence, in this subsection we will compare responses to increased integration with the EU in terms of the regional concentration of manufacturing employment, output and exports.

Figure 8.3: Lorenz curve of regional concentration of manufacturing employment, output and exports in Slovenia in 1994

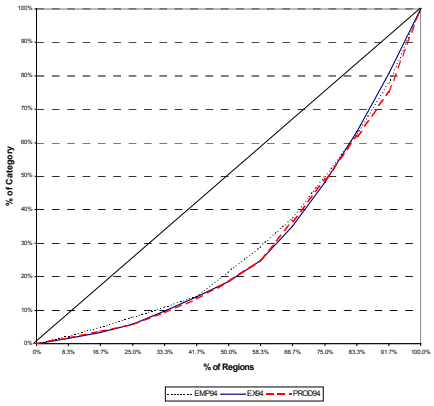
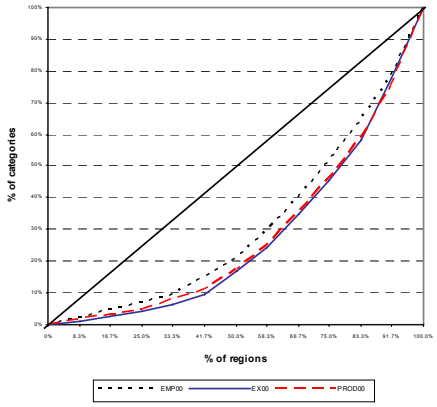


Figure 8.4: Lorenz curve of regional concentration of manufacturing employment, output and exports in Slovenia in 2000



Figures 8.3 and 8.4 do indeed demonstrate much greater responses in manufacturing output and exports to increased integration with the EU during the 1990s than was the case with manufacturing employment. Both manufacturing output and export regional specialization increased in 2000 compared to 1994. Individual regions responded differently to changed demand patterns. The consequence of this is the relocation of manufacturing activities among regions and, hence, higher regional specialization. Evidently, this was not the case with the regional concentration of manufacturing employment. At the beginning of the observed period, in 1994, the concentration of manufacturing employment, output and exports did not differ significantly across regions. At the end of the period, in 2000, however, the concentration of manufacturing output and exports had increased significantly, while the concentration of employment remained virtually unchanged. This means that only output and exports across regions adapted to the changed demand pattern and that employment has yet to follow this pattern.

4 Location and Concentration of Industrial Activity

4.1 Evolution of the Manufacturing Structure (1994-2000)

It is apparent from Table 8.10 that there has been a shift in the structure of manufacturing employment during the period of economic integration. The largest gain in employment share can be observed in electrical and optical equipment (DL), where the share of employment has increased by three percentage points. Other winning industries are basic metals and fabricated metal products (DJ), chemical products (DG) and food, beverages and tobacco (DA). On the other side, textiles and textile products (DB) (with a decrease by about 3 percentage points), machinery and equipment (DK) and non-metallic mineral products (DI) faced decreased employment shares. The rest of the manufacturing industries were less affected by the accession process in terms of employment.

Table 8.10: Distribution of employment in NACE-2 manufacturing industries (as shares of total employment in manufacturing)

Industry	**Share of total employment in 1994 (%)**	**Share of total employment in 2000 (%)**
DA	8.65	9.27
DB	16.29	13.16
DC	4.77	3.4
DD	4.8	4.21
DE	6.52	6.52
DF	0.39	0.05
DG	5.88	7.96
DH	4.37	4.14
DI	5.16	4.57
DJ	11.87	13.9
DK	10.05	8.83
DL	11.38	14.39
DM	4.5	3.9
DN	5.38	5.7

Source: SURS

4.2 Evolution of Industrial Specialization

Trade liberalization does not seem to have influenced labor relocation significantly in the case of Slovenia. No common trend can be found for labor flows in Slovenia with respect to the manufacturing specialization indices. The effects of economic integration on the concentration and relocation of industrial activity still have to be explored. Similarly, as in the case of regional specialization, we attempt to analyze the evolution of the location and concentration of industrial activity in this section using concentration and specialization indices.

Table 8.11 represents the evolution of the Herfindahl index measuring the absolute geographic concentration of manufacturing industries. Again, as in the case of regional specialization, most indices show a relatively low absolute geographic concentration, with values of the Herfindahl index averaging about 0.2. There are, however, some notable exceptions, such as the fuel industry (DF), where the index had been, understandably, much higher (it fell from 0.87 in 1994 to 0.51 in 2000), as well as leather products (DC), where the Herfindahl index has decreased substantially from 0.45 in 1994 to 0.27 in 2000. A decrease in geographic concentration can also be observed in the rubber (and plastic products) industry (DH) and in the machinery and equipment industry. On the other hand, there has been an increase in the geographic concentration of the transport equipment industry (DM) and of the furniture industry (DN).

Table 8.11: Evolution of Herfindahl indices of absolute geographic concentration of manufacturing employment by NACE-2 industries in Slovenia from 1994-2000

No.	Industry	1994	1995	1996	1997	1998	1999	2000	00/94
1	**DA**	0.16	0.18	0.18	0.17	0.17	0.18	0.18	1.13
2	**DB**	0.13	0.13	0.13	0.11	0.13	0.14	0.16	1.23
3	**DC**	0.45	0.46	0.43	0.36	0.30	0.29	0.27	0.60
4	**DD**	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1.00
5	**DE**	0.31	0.30	0.31	0.29	0.30	0.30	0.28	0.90
6	**DF**	0.87	0.87	0.87	0.64	0.51	0.50	0.51	0.59
7	**DG**	0.27	0.26	0.27	0.30	0.29	0.28	0.28	1.04
8	**DH**	0.25	0.25	0.25	0.17	0.18	0.15	0.14	0.56
9	**DI**	0.14	0.14	0.13	0.17	0.14	0.15	0.14	1.00
10	**DJ**	0.16	0.15	0.14	0.19	0.14	0.14	0.14	0.88
11	**DK**	0.16	0.17	0.16	0.18	0.12	0.13	0.12	0.75
12	**DL**	0.16	0.17	0.17	0.13	0.16	0.16	0.16	1.00
13	**DM**	0.21	0.22	0.25	0.28	0.28	0.31	0.37	1.76
14	**DN**	0.03	0.12	0.11	0.10	0.11	0.11	0.11	3.67

Herfindahl index: $H_i^S = \sum_j (s_{ij}^S)^2$, where s_{ij}^S is share of employment in industry *i* in region *j* in total employment in industry *i*.

Source: SURS, authors' calculations

The evolution of the Herfindahl indices of geographic concentration over the period 1994-2000 reveals that the two most concentrated industries, namely fuel and leather products, have become dispersed following economic integration with the EU. On the other hand, transport equipment and furniture industries have further consolidated as a result of trade liberalization, which has led to an increase in geographical concentration.

The Balassa index, a relative measure of geographical concentration, compares the geographical concentration of employment in an industry to the geographical concentration of total employment. Thus, a value of the Balassa index for industry *i* greater than one indicates that the geographical concentration of that industry is larger than the geographical concentration of total manufacturing.

Table 8.12: Evolution of Balassa indices of relative geographic concentration of manufacturing employment by NACE-2 industries in Slovenia from 1994-2000

No.	Industry	1994	1995	1996	1997	1998	1999	2000	00/94
1	**DA**	0.95	1.43	0.95	1.50	0.93	0.94	0.93	0.98
2	**DB**	1.01	1.33	1.07	1.04	1.10	1.07	1.06	1.05
3	**DC**	0.59	0.99	0.60	0.86	0.67	0.68	0.72	1.22
4	**DD**	1.36	3.11	1.19	1.15	1.14	1.21	1.24	0.91
5	**DE**	0.73	0.54	0.78	0.69	0.71	0.72	0.74	1.01
6	**DF**	1.07	2.87	1.21	1.29	0.57	0.57	0.57	0.53
7	**DG**	0.75	1.53	0.76	1.19	0.71	0.71	0.72	0.96
8	**DH**	1.08	1.26	0.97	1.91	1.07	1.16	1.21	1.12
9	**DI**	1.23	1.82	1.28	1.85	1.33	1.36	1.28	1.04
10	**DJ**	0.98	1.83	1.94	2.23	1.05	1.07	1.10	1.12
11	**DK**	1.07	1.75	1.02	1.54	1.11	1.00	1.02	0.95
12	**DL**	0.97	1.15	0.98	1.23	0.95	0.95	0.94	0.97
13	**DM**	1.12	1.21	1.03	1.12	0.93	0.95	0.72	0.64
14	**DN**	1.29	1.16	1.26	1.23	1.24	1.28	1.31	1.02

Balassa index: $RS_i = \frac{1}{J}\sum_j RS_{ij}$, where $RS_{ij} = \frac{s_{ji}^S}{s_j}$, where s_{ji}^S is the share of employment in industry *i* of region *j* in total employment in industry *i*, and s_j is the share of total employment of region *j* in total employment and *J* is the number of regions.

Source: SURS, authors' calculations.

Table 8.12 reveals that geographical concentration has increased only for leather and leather products (DC), rubber and plastic products (DH) and basic metals and fabricated metal products (DJ), relative to the concentration of manufacturing in general. In all other industries geographic concentration did not change substantially. Indeed, in the wood industry (DD), fuel products (DF) and transport equipment (DM), it has largely decreased. Based on the above evidence, we cannot make any significant inferences about geographical concentration.

The Krugman dissimilarity indices, showing the difference between the regional share of employment in an industry and the average (national) share of that industry's employment, are represented in Table 8.13. Higher dissimilarity indices imply that an industry is either regionally dispersed or concentrated relative to the national average. Krugman indices close to zero therefore imply that the regional structure of manufacturing employment in all industries closely resembles that of the average national structure, while higher values of the indices mean that the regional employment structures differ greatly from the national levels.

Results in Table 8.13 indicate that the dissimilarity index has increased in seven of the 14 industries, most notably in the textile industry (DB), transport equipment industry (DM) and the furniture industry (DN), while it has decreased in six industries. The largest decreases in dissimilarity of geographic concentration can be observed in fuel products (DF), rubber and plastic products (DH), leather (DC) and paper products (DE) as well as machinery sector (DK). The changes in the remaining industries are not significant.

Table 8.13: Evolution of dissimilarity indices of the geographic concentration of manufacturing employment by NACE-2 industries in Slovenia from 1994-2000

No.	Industry	1994	1995	1996	1997	1998	1999	2000	00/94
1	**DA**	0.53	0.60	0.57	0.52	0.51	0.53	0.55	1.04
2	**DB**	0.43	0.74	0.47	0.47	0.52	0.53	0.54	1.26
3	**DC**	1.03	1.02	1.01	1.31	0.82	0.80	0.80	0.78
4	**DD**	0.64	0.66	0.56	0.47	0.50	0.52	0.56	0.88
5	**DE**	0.82	0.81	0.74	0.67	0.67	0.66	0.65	0.79
6	**DF**	1.70	1.56	1.73	1.37	1.32	1.33	1.33	0.78
7	**DG**	0.80	0.72	0.77	1.08	0.79	0.78	0.77	0.96
8	**DH**	0.85	0.87	0.80	0.75	0.76	0.67	0.64	0.75
9	**DI**	0.64	1.03	0.62	0.89	0.70	0.75	0.71	1.11
10	**DJ**	0.48	0.63	0.49	0.58	0.47	0.47	0.50	1.04
11	**DK**	0.55	0.67	0.61	0.46	0.45	0.45	0.43	0.78
12	**DL**	0.51	0.82	0.50	0.53	0.53	0.54	0.53	1.04
13	**DM**	0.83	0.72	0.93	0.82	0.98	1.00	0.99	1.19
14	**DN**	0.37	0.55	0.38	0.41	0.39	0.40	0.45	1.22

Dissimilarity index: $DSR_i = \sum_j \left| s_{ji}^S - s_j \right|$, where s_{ji}^S is share of employment of region *j* in industry *i* in total employment of industry *i*, and s_j is share of total employment of region *j* in national manufacturing employment.

Source: SURS, authors' calculations.

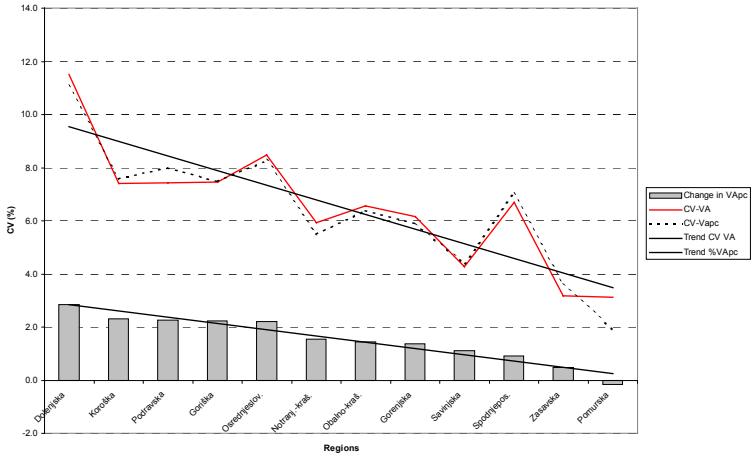
5 Relation between specialization, polarization and unemployment

5.1 Does greater specialization imply greater polarization?

In this section we compare the variation between regional GDP and per capita GDP in order to determine whether greater concentration of manufacturing is associated with concentration of population. As we have data on regional GDP only for up to 1997, we instead use data on manufacturing value added. For the variables value added (VA) and value added per capita (VA per capita), coefficients of variation have been calculated. Calculated coefficients presented in Figure 8.5 shows that variation in VA is in general matched by variation in VA per capita. This indicates that there was almost no relocation of population between regions. The only exceptions occurred in the Podravska and Pomurska regions, where shifts in population were modest but significant. Hence, one can conclude that inter-regional relocation of manufacturing output implies greater polarization, as population does not follow this pattern.

Another interesting feature that can be observed in Figure 8.5 is that variation in VA per capita is positively correlated with the sign of the variation. Regions that have experienced larger variations in VA per capita have also recorded larger absolute growth of value added per capita over the period 1994-1998. In other words, more turbulent regions have grown faster. One possible explanation for this interesting fact is that declining regions lack initiatives that would induce positive turbulence into the regions.

Figure 8.5: Variation of value added and value added per capita across regions in Slovenia from 1994-98 (%)



5.2 Do declining regions experience higher unemployment?

Previous sections have shown that economic integration has induced relocation of manufacturing activity between regions. These shifts, however, have not caused any significant adaptation processes in manufacturing employment or population between regions. Obviously, the excess labor force that was released in the declining regions did not move to the regions with increasing employment, but remained unemployed. Lower growth, in terms of GDP per capita at the regional level, is therefore associated with higher unemployment rates.

Table 8.14: Test: Do poor regions suffer from unemployment?

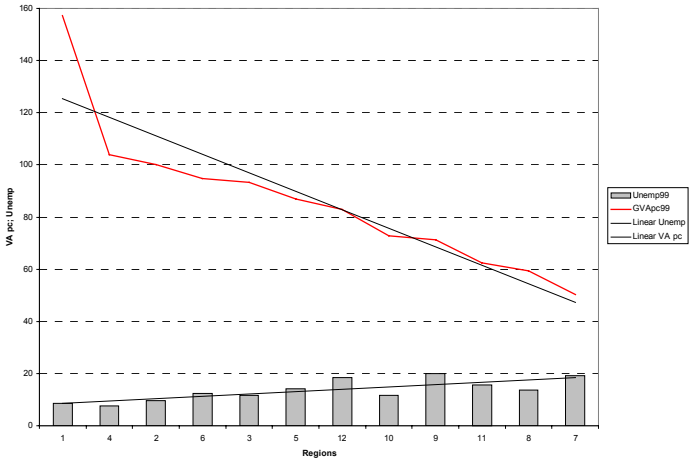
	OLS	FE	RE
Const.	**21.711	**25.026	**22.222
	(12.23)	(3.52)	(7.57)
VApc	**-0.090	-0.128	**-0.096
	(-4.56)	(-1.56)	(-2.97)
Adj. R^2	0.362	0.095	0.388
No. of obs.	36.0	36	36
Hausman Chi^2	-	-	0.18

Dependent variable: Rate of unemployment
t-statistics in parentheses; * and ** denote coefficient estimates significant at 1 and 5 per cent

In order to test this hypothesis, we use data on value added per capita and unemployment rates at the regional level that are available for the period 1997-1999 only. The results of econometric tests are reported in Table 8.14 and illustrated in Figure 8.6. Both OLS and random effects (RE) model estimations[2] (while in fixed effects (FE) model specification the relationship, while negative, is insignificant) confirm that there is a strong negative association between VA per capita and unemployment rates. Hence, there is clear evidence of greater unemployment in poor regions – poor regions are more likely to suffer from unemployment than rich regions.

[2] The Hausman specification test indicates that, in this case, the RE estimator provides the least biased estimate.

Figure 8.6: Value added per capita and unemployment rates from 1994-98 (%)



6 Does economic geography work in Slovenia?

Following the discussion in the introductory section, in the present section we evaluate the implications of the EG models for Slovenia. A basic proposition of the economic geography model by Damijan and Kostevc (2002) for transition countries is that, after trade has been liberalized, the pattern of inter-regional manufacturing relocation will be determined by a trade-off between agglomeration effects, remaining trade (transport) costs and existing differences in relative regional factor costs. With unchanged inter-regional transport costs, regions that are located closer to the EU border (western and northern regions) might benefit from trade liberalization through larger inflows of FDI due to lower trade costs with the EU and lower wages. Some domestic resources might also relocate to border regions. As a result, border regions may converge with the home capital region in terms of relative wages and relative manufacturing output. In non-border regions, however, further divergence might occur. After a certain threshold of trade costs with the EU has been reached, the trend toward convergence of border regions might be reversed. Therefore, regional data for accession countries might exhibit an inverted U-shaped relationship between the relative FDI, relative wages and relative manufacturing output with respect to the foreign trade costs. This process could also be inverted when the agglomeration effects in the existing economic centers prevail over lower factor costs and lower trade costs in the border regions. In this case, a divergence in relative regional wages is expected in the first stage of trade liberalization and a convergence afterwards. In any case, a non-monotonic relationship between reduction of foreign trade costs and relative regional wages is expected to occur in the long run.

A number of papers study these issues for the USA (see Hanson 1996, 1997, 1998; Kim 1995, etc.) and for the EU (refer to Amiti 1998, 1999; Brülhart and Torstensson 1998, etc.). In next subsections we test three basic predictions of EG for Slovenia in order to verify whether regional development in Slovenia after trade liberalization with the EU is occurring according to the predictions of EG theory. The following propositions are tested:

- an initial increase in FDI inflows and a later relative reduction of FDI inflows into western/northern border regions increasing with distance from the capital and decreasing with distance from the W/N border,
- initial dispersion of production (convergence) and later further regional concentration,
- initial convergence and later divergence of relative wages in western/northern border regions.

6.1 Methodology and data

6.1.1. The Data

It is worth noting that for this paper 'official' and 'unofficial' regional databases for Slovenia were constructed. The source of the 'official' database is the Slovenian statistical office (SURS). However, the database is only of limited use, since it is incomplete and covers only the years 1995-1997. The official data also does not cover many of the indicators needed for the analysis. Slovenia does not have a long tradition of collecting regional statistics, which is due in large part to the fact that it is still not clear what the future statistical regions will be. Slovenian statistical regions have been in use since the mid-nineties. The existing system of regions is being questioned by the EU Economic Commission. Hence, we use the official source of data only when dealing with some special issues, e.g., polarization and unemployment.

For all other purposes we have constructed an 'unofficial' database using firms' balance sheets and income statements (the source of the data is the Agency for payments). These data cover manufacturing firms only, for the period of 1994-2000. For the purposes of our analyses, these data are aggregated to regional (NUTS-3) and to community (NUTS-5) levels. Here, 170 NUTS-5 regions (communities), classified into 12 broader NUTS-3 regions, are taken as units of observation. NUTS-3 dummy variables have been used in order to control for these broader common regional effects. All the data are recalculated into 1994 constant prices using PPI indices. The data in our database include many aspects of regional performance, but we explore only a small part of it.

6.1.2. The Methodology

In all of the subsequent analyses and empirical estimations, we use relative regional indicators in order to capture inter-regional relocation patterns in Slovenia. Relative regional indicators are calculated as a ratio of *i*-th regional performance to the capital (*c*) region's performance.

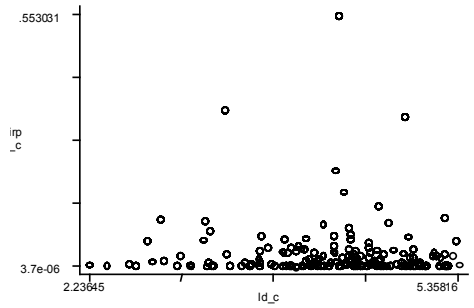
When dealing with panel data on regions over a time span of 7 years, one should take explicit account of region-specific effects. Without explicit control for this, one might get biased estimates of coefficients since FDI inflows, output growth and changes in relative wages might be correlated over time or subject to random shocks. Using statistical specifications of the models, there are two possible ways to control for this bias. The first and most obvious option is to employ the fixed effects (FE) estimator, which assumes fixed (constant) region-specific effects over time. On the other side, the random effects (RE) estimator assumes that region-specific effects are random and only reflected in the error term; i.e., uncorrelated over time. The FE estimator is usually more robust but quite inaccurate, while the RE estimator is sensitive to assumptions but more accurate. From a substantial point of view, we are interested in observing the pattern of changes in relative regional performance over time induced by external shocks such as trade liberalization. Under different trade regimes, regions respond differently to some inherent forces. Hence, the RE estimator is more suitable for our purposes. Another drawback of the FE estimator in the present case is that some of the crucial variables in our empirical model are time invariant (such as transport costs proxied by road distances in kilometers or the border dummy for regions bordering the EU). These variables are naturally dropped from the estimation procedure when using the FE estimator. Therefore, it makes no sense in the present case to conduct formal Hausman tests for the validity of the model specification. Hausman tests will, of course, be unable to reject the hypothesis of systematic differences among FE and RE estimators. In turn, they would imply the acceptance of the FE specification, which is, as we saw, incorrect. Hence, the RE estimator provides a better specification for our econometric models.

6.2 Impact of Economic Geography on regional economic concentration

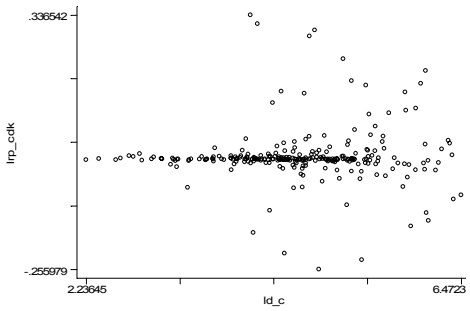
In this subsection we explore the pattern of inter-regional manufacturing relocation in Slovenia during the 1994-2000 period. Initially, according to the standard EG hypothesis, regions closer to the capital city would have a greater concentration of manufacturing activity. Along with economic integration with the EU, relocation of manufacturing activity should take place. In line with the Krugman (1991) type of EG models, we should observe further monotonic reduction of manufacturing activity in the more distant regions and further concentration of manufacturing activity in regions closer to the capital region. The Krugman-Venables type of EG model proposes a non-monotonic, U-shaped

evolution of relative regional output – convergence of relative output should take place after initial divergence. In addition, the Damijan-Kostevc EG model predicts an even more pronounced U-shaped pattern of relocation of relative regional output as FDI inflows into regions bordering the EU foster quicker adjustment in the EU-bordering regions. Figure 8.7a reveals that in Slovenia there is no pronounced initial geographic pattern of production in line with the standard EG hypothesis. In contrast, the figure suggests an inverse relationship between initial relative regional output and distance to the capital. Figure 8.7b provides little evidence for the convergence of relative production with respect to the initial level. In addition, Figure 8.7c shows that there is no convergence/divergence path for relative regional output with respect to distance from the capital, and Figure 8.7d shows no convergence in western/northern border (W/N) regions.

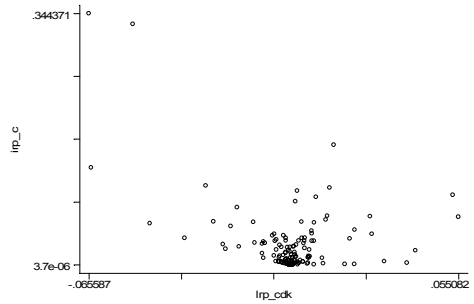
Figure 8.7: Relative regional manufacturing output in Slovenia



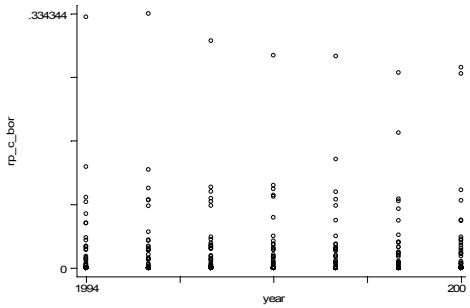
a) Initial relative output and distance



c) Cumulative growth of relative output and distance



b) Initial relative output and cumulative growth



d) Evolution of output in W/N regions

The pattern of relative regional production relocation has been estimated using the following linear model: [3]

(1) $$ln\ \mathbf{rPROD} = \alpha + \beta\, ln\ \mathbf{irPROD} + \gamma\, ln\ \mathbf{irWAGE} + \delta\, ln\ \mathbf{irVAe} + \phi\, ln\ \mathbf{FDI} + \xi\, ln\ \mathbf{DIST} + \varphi\, \mathbf{BORD} + \lambda\, ln\ \mathbf{TC} + \upsilon\, ln\ \mathbf{DIST}*\mathbf{BORD}*\mathbf{TC} + \rho\, \Sigma\mathbf{R} + \tau\, \Sigma\mathbf{T} + \varepsilon_{it}$$,where:

rPROD	$rPROD = P_{it}/P_{ct}$ is the relative production of the region *i* with respect to the central region *c* in time period *t*,
irPROD	is the initial relative production,
irWAGE	is the initial relative wage,
irVAe	is the initial relative value added per employee,
FDI	is the share of aggregate FDI in the employment of the region *i*,
TC	is the region's average tariff rate[4] as a proxy for foreign trade costs,
DIST	is a proxy for trade/transport costs between home regions; it is measured as the distance (in km) between the *i*-th region and the capital region
BORD	is a dummy variable for western/northern (W/N) regions, i.e., regions bordering EU member countries,
*DIST*BORD* TC*	is an interaction term, which proxies for distance effects in border regions,
ΣR and ΣT	are matrices of regional[5] and time dummies,
ε_{it}	is the error term.

The model (1) is estimated using different model specifications as well as different specifications of the data. The model is estimated using NUTS-5 regional data in levels, in differences and then in cumulative differences. The most conclusive results seem to emerge when cumulative differences are used, mainly due to the fact that both data in levels and data in differences fail to show overall long-term trends and shift the focus to short-term changes. The short-term effects vary substantially and fail to encompass properly the underlying trend, which can best be observed using cumulative differences.

Results in Table 8.15 suggest that both year-to-year changes and a cumulative long-term change in relative production are negatively correlated with initial relative production in the region, implying a convergence with respect to the central region. The trend of convergence, however, is very weak. What are the driving forces behind it? Apparently, the initial regional wage differential and the productivity differential do not seem to be responsible for it. Neither is economic geography, since diminishing trade costs with the EU did not result in a stronger convergence/divergence path for relative output. Similarly, border regions did not account for a significantly different convergence/divergence path for relative output. The only exception is internal, inter-regional trade costs (proxied by time invariant distance), where the estimation with cumulative differences reveals a negative correlation between long-term changes in relative production and distance from the capital. This fact, in contrast to the autoregressive convergence path, speaks in favor of divergence in relative regional output.

[3] Theoretically, a more proper specification of the regional wages model should also include non-linear terms. Unfortunately, in our model this is not possible because some of the crucial variables (such as border dummies and distance) are non-parametric and time-invariant.

[4] A region's average tariff rate is calculated from tariffs at the national level for imports from the EU weighted by the individual region's production structure.

[5] NUTS-3 dummy variables have been used in order to control for broader common regional effects.

Table 8.15: Does Economic Geography affect regional concentration of manufacturing?

	Data in levels		First differences		Cumul. Differences[1]	
Estimator	**RE**	**RE**	**RE**	**RE**	**OLS**	**OLS**
Const.	***-5.072	***-4.694	0.109	0.317	**1.585	2.239
	(-9.29)	(-7.53)	(0.80)	(1.22)	(2.04)	(1.37)
irPROD	-	-	***-0.030	***-0.033	***-0.245	***-0.266
	-	-	(-2.69)	(-2.83)	(-3.71)	(-3.85)
irWAGE	***3.989	***4.224	-0.013	0.045	0.055	0.415
	(8.92)	(8.98)	(-0.16)	(0.52)	(0.11)	(0.81)
irVA/emp	***-0.980	***-0.990	-0.014	-0.039	-0.155	-0.319
	(-2.79)	(-2.73)	(-0.27)	(-0.71)	(-0.50)	(-1.00)
FDI	***0.065	***0.060	***0.021	**0.018	***0.209	***0.209
	(4.41)	(4.11)	(2.91)	(2.37)	(4.95)	(4.69)
DIST	0.214	0.076	-0.244	-0.338	-1.732	***-2.838
	(0.39)	(0.13)	(-1.41)	(-1.48)	(-1.39)	(-1.67)
BORD	0.764	*1.098	0.198	0.256	-0.973	0.961
	(1.29)	(1.68)	(0.60)	(0.70)	(-0.70)	(0.52)
TC	0.531	0.236	-0.083	-0.179	-1.458	-2.040
	(1.03)	(0.45)	(-0.51)	(-0.89)	(-1.25)	(-1.25)
DIST*TC	-0.469	-0.399	0.164	0.215	1.210	1.995
	(-0.91)	(-0.77)	(1.02)	(1.15)	(1.04)	(1.40)
DIST*BORD*TC	0.008	0.014	-0.028	-0.029	0.208	-0.100
	(0.10)	(0.17)	(-0.50)	(-0.48)	(0.78)	(-0.30)
Year dummies	No	Yes	No	Yes	No	No
Region dummies	No	Yes	No	Yes	No	Yes
Hausman Chi^2	60.5	45.32	19.79	12.51		
Prob chi^2	0.000	0.000	0.001	0.253		
Number of obs.	1134	1134	972	972	162	162
Adj R^2	0.379	0.431	0.029	0.043	0.168	0.157

Dependent variable: relative regional manufacturing output
t-statistics in parentheses; *,** and *** denote coefficient estimates significant at 10, 5 and 1 per cent
1 Cumulative difference is a difference in variable between the last and the first period.

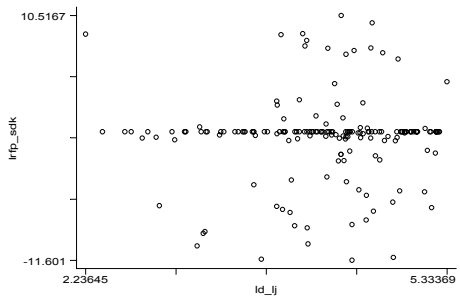
On the other hand, in all model specifications some conclusive evidence is found that manufacturing concentration in Slovenia is positively correlated with the presence of FDI. Regions with larger relative FDI stocks converge more quickly with the capital region in terms of relative output.

In summary, pure trade liberalization does not seem to foster regional manufacturing relocation. In addition, W/N border regions do not seem to benefit or lose in trade integration with the EU. Hence, none of the EG hypotheses found confirmation in the Slovenian regional data for the period of transition.

6.3 Impact of Economic Geography on regional distribution of FDI

According to the above findings, FDI appears to be quite important for manufacturing relocation. As proposed by the Damijan-Kostevc model, FDI inflows into home regions are determined by (i) differences in relative factor costs, (ii) trade costs between the home country and the foreign country as well as trade (transport) costs between home regions, and (iii) agglomeration effects. Figure 8.8 shows the pattern of relative regional manufacturing output produced by foreign investment firms (FIEs) in western and northern border regions. Figure 8.8a reveals a monotonic and slightly decreasing trend in relative regional performance of FIE in border regions, while figure 8.8b shows virtually no correlation between the relative FDI and the distance from the country's capital.

Figure 8.8: Regional distribution of FDI in Slovenia



a) Evolution of FDI in W/N regions

b) Cumulative growth of FDI and distance

In order to further verify the above relationship, we have estimated the following model of relative regional FDI performance:

(2) $$ln\ \mathbf{rFDI} = \alpha + \beta\, ln\ \mathbf{irFDI} + \gamma ln\ \mathbf{rPROD} + \delta\, ln\ \mathbf{rWAGE} + \phi\, ln\ \mathbf{iVAe} + \xi\ ln\mathbf{DIST} + \varphi\, \mathbf{BORD} + \lambda\ ln\ \mathbf{TC} + \upsilon\, ln\ \mathbf{DIST}*\mathbf{BORD}_i*\mathbf{TC} + \rho\, \Sigma\mathbf{R} + \tau\, \Sigma\mathbf{T} + \varepsilon_{it}$$ where:

rFDI	$rFDI = F_{it}/F_{ct}$ is relative FDI of the region *i* with respect to the central region *c* in time period *t*,
irFDI	is the initial relative FDI,
irPROD	is the initial relative production,
rWAGE	is the relative wage, proxying for differences in relative factor costs,
irVAe	is the initial relative value added per employee,
TC	is the region's average tariff rate as a proxy for foreign trade costs,
DIST	is a proxy for trade/transport costs between home regions; it is measured as a distance (in km) between the *i*-th region and the capital region
BORD	is a dummy variable for western/northern (W/N) regions, i.e., regions bordering EU member countries,
*DIST*BORD* TC*	is an interaction term, which proxies for distance effects in border regions,
ΣR and ΣT	are matrices of regional[6] and time dummies,
ε_{it}	is the error term.

As in the first test, the results in Table 8.16 provide little evidence in favor of the economic geography hypothesis. FDI in Slovenia does not tend to concentrate in regions closer to the capital region (distance does not matter) or to EU borders (W/N border regions do not attract more FDI). Relative FDI is shown to be strongly negatively correlated with relative output and initial FDI stock, implying that existing economic centers tend to attract relatively less FDI.[7] However, differences in relative factor costs (wages) also do not seem to attract more FDI.

In summary, FDI in Slovenia does not seem to work in line with the economic geography models. Hence, the impact of FDI on relocation of manufacturing and relative wages is smaller than has been predicted by Damijan and Kostevc (2002). It is apparent that regional FDI in Slovenia is more likely to be randomly distributed than distributed according to EG models.

[6] NUTS-3 dummy variables have been used in order to control for broader common regional effects.

[7] Note that in this specification, FDI is specified as relative regional FDI stock with respect to the central region, while in the model (1), FDI is specified as the share of employment by foreign investment firms in the total employment of the individual region.

Table8.16: Does Economic Geography affect regional distribution of FDI?

	Data in levels		First differences		Cumul. differences	
Estimator	**RE**	**RE**	**RE**	**RE**	**OLS**	**OLS**
Const.	***-4.854	-2.390	-0.782	-0.104	**-4.111	-1.788
	(-3.86)	(-1.37)	(-1.34)	(-0.09)	(-2.20)	(-0.44)
irFDI	-	-	***-0.117	***-0.120	***-0.715	***-0.725
	-	-	(-4.95)	(-4.82)	(-9.04)	(-8.56)
rPROD	***-0.526	***-0.490	*-0.087	-0.077	***-0.452	***-0.452
	(-6.29	(-5.67)	(-1.83)	(-1.56)	(-3.08)	(-3.02)
rWAGE	-0.398	-0.589	-0.001	-0.173	-1.337	-1.293
	(-1.07)	(-1.27)	(0.00)	(-0.45)	(-1.03)	(-0.97)
irVA/emp	***0.934**	0.855	-0.031	-0.017	0.071	-0.009
	(1.71)	(1.58)	(-0.15)	(-0.08)	(0.10)	(-0.01)
DIST	0.005	-0.757	0.262	-0.211	1.688	-0.810
	(0.00)	(-0.44)	(0.34)	(-0.21)	(0.53)	(-0.19)
BORD	-1.536	-1.448	0.655	1.173	-1.496	1.105
	(-0.84)	(-0.75)	(0.43)	(0.71)	(-0.41)	(0.23)
TC	0.694	-0.298	0.280	-0.162	1.911	0.055
	(0.49)	(-0.20)	(0.39)	(-0.18)	(0.65)	(0.01)
DIST*BORD*TC	-0.008	0.050	-0.137	-0.215	0.128	-0.308
	(-0.03)	(0.17)	(-0.54)	(-0.78)	(0.19)	(-0.34)
Year dummies	No	Yes	No	Yes	No	No
Region dummies	No	Yes	No	Yes	No	Yes
Hausman Chi^2	10.88	11.75	2.3	1.38	-	-
Prob chi^2	0.092	0.466	0.890	1.000	-	-
Number of obs.	1134	1134	972	972	162	162
Adj R^2	0.191	0.245	0.027	0.039	0.328	0.328

Dependent variable: relative FDI output growth
t-statistics in parentheses; *,** and *** denote coefficient estimates significant at 10, 5 and 1 per cent

6.4 Impact of Economic Geography on relative wages

In this last section, we attempt to clarify the impact of economic geography models on relative regional wages in Slovenia. The orthodox proposition of the EG models assumes that no international trade was present prior to trade liberalization. This is a clear contradiction of reality, especially in Slovenia's case, since Slovenia was relatively open to international trade before 1990. Hence, one could argue that the initial allocation of manufacturing has already been, to some extent, dependent on foreign trade considerations, giving western border regions higher manufacturing concentration than would otherwise be expected. Table 8.17 shows the changes in relative wages (relative to the central region) in Slovenian NUTS 5 regions from 1994 to 2000. It is apparent that relative wages in western and northern border regions have increased more than in other non-border regions. According to this, one might hypothesize divergence between western/northern border regions and non-border regions as predicted by the Damijan-Kostevc model.

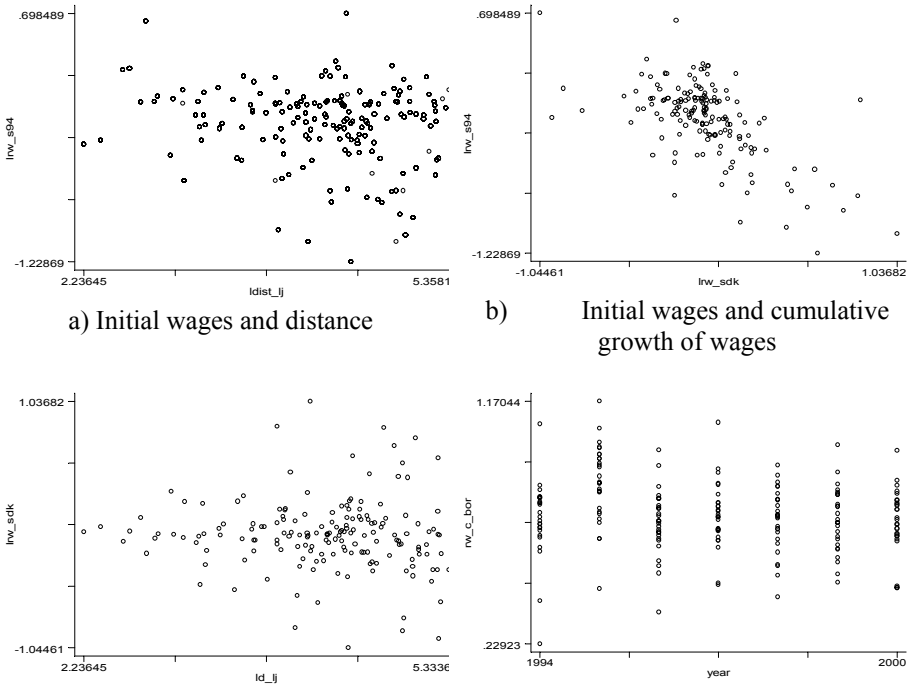
Table 8.17: Changes in relative regional wages in Slovenia from 1994 to 2000

	Non-W/N border regions		W/N border regions		All regions	
	1994	**2000**	**1994**	**2000**	**1994**	**2000**
Mean	0.659	0.680	0.667	0.752	0.660	0.692
Std. Error	0.021	0.017	0.042	0.051	0.019	0.016
Std. Deviation	0.251	0.199	0.222	0.270	0.246	0.213
Coef. of variation	38.2%	29.2%	33.3%	35.9%	37.3%	30.8%
N	142	142	28	28	170	170

Source: SURS, authors' calculations.

Figure 8.9a shows that initial relative regional wages in western/northern regions were slightly decreasing with distance from the capital region. This trend, however, is not statistically significant. Figure 8.9b reveals that the cumulative change in relative wages in W/N regions from 1994 to 2000 shows a decreasing trend with respect to the initial levels, which implies convergence. Figure 8.9c depicts the relationship between cumulative growth in relative regional wages and distance from the capital city. The figure reveals increased dispersion of cumulative growth of relative regional wages with distance from the capital, but no significant trend can be depicted. Finally, Figure 8.9d reveals a non-monotonic, U-shaped pattern of evolution of relative wages in W/N regions. This fact confirms the predictions of the Krugman-Venables type of EG models, while the predictions of the simple Krugman (1991) type of EG models (monotonically decreasing relative wages) are rejected. It remains to be seen whether these findings can be formally confirmed by the data.

Figure 8.9: Relative regional wages in the western/northern border regions in Slovenia



a) Initial wages and distance

b) Initial wages and cumulative growth of wages

c) Cumulative growth of wages and distance

d) Evolution of wages in W/N regions

We have verified the above estimations by estimating the following linear model of relative regional wages in Slovenia:

(3) $$ln\ \mathbf{rWAGE} = \alpha + \delta\ ln\ \mathbf{irVAe} + \theta\ ln\ \mathbf{rPROD} + \phi\ ln\ \mathbf{rFDI} + \beta\ ln\ \mathbf{DIST} + \gamma\ \mathbf{BORD} + \lambda\ ln\ \mathbf{TC} + \nu\ ln\mathbf{DIST*BORD*TC} + \rho\ \Sigma\mathbf{R} + \tau\ \Sigma\mathbf{T} + \varepsilon_{it},$$

where:

rWAGE	$rWAGE = w_{it}/w_{ct}$ is the relative wage of the region *i* with respect to the central region *c* in time period *t*,
irVAe	is the initial regional relative value added per employee – it serves as a proxy for initial differences in relative wages,
rPROD	is relative production,
rFDI	is the initial relative production,
TC	is the region's average tariff as a proxy for foreign trade costs,
DIST	is a proxy for trade/transport costs between home regions; it is measured as a distance (in km) between the *i*-th region and the capital region
BORD	is a dummy variable for western/northern (W/N) regions, i.e., regions bordering EU member countries

*DIST*BORD*TC* is an interaction term, which proxies for distance effects in border regions after trade liberalization has been initiated

ΣR and ΣT are matrices of broader regional and time dummies,

ε_{it} is the error term.

Based upon the model's implications, the following predictions regarding the signs of coefficients can be made:

$\theta > 0$ relative wages are increasing in relative manufacturing shares,

$\phi > 0$ relative wages are increasing in relative FDI shares,

$\beta < 0$ the distance effects become less important over time,

$\gamma > 0$ W/N border regions converge in terms of relative wages,

$\nu > 0$ trade liberalization enhances convergence of relative wages in W/N border regions.

The results in Table 8.18 provide some confirmation of the EG hypothesis for Slovenia, but this remains inconclusive. Distance from the capital does not seem to be very important for determining relative regional wages since the coefficients for distance remain insignificant both in the model with data in levels[8] as well as in the models with data in first and cumulative differences. On the other hand, wages in regions bordering the EU seem to converge with the capital city's wages (the coefficient is positive in all specifications, but significant only in the case of the cumulative differences). At the same time, this is true only for those W/N regions that are located closer to the capital.

Pure trade liberalization (reduction in trade costs) and openness to FDI inflows do not seem to drive the process of convergence of relative wages between regions. It is more likely that the general process of transition to a market economy, coupled with greater openness to trade, has been driving this process. One can therefore conclude that neither the Krugman (1991) model nor the Krugman-Venables type of EG models has found confirmation in the Slovenian regional data during the transition process. An explanation for the lack of evidence in favor of the Damijan-Kostevc EG model, which stresses the importance of FDI, is the minor role of FDI in the 'Slovenian way of transition'. It remains to be seen, however, whether this model fits the data for other transition countries that have based their restructuring more heavily on FDI better.

[8] The only exception is the estimatation in the model with levels but without included time and broad region dummies.

Table 8.18: Does Economic Geography affect regional relative wages?

	Data in levels		First differences		Cumul. differences	
Estimator	**RE**	**RE**	**RE**	**RE**	**OLS**	**OLS**
Const.	0.601	0.508	1.170		0.069	0.070
	(15.54)	(10.8)	(11.28)		(1.04)	(0.67)
lrVA/emp	****0.010**	****0.114**	0.003	0.006	0.001	0.070
	(1.96)	(2.19)	(0.27)	(0.59)	(0.16)	(0.84)
rPROD	***0.394	***0.472	-0.548	-0.409	-0.250	-0.007
	(3.44)	(4.22)	(-1.31)	(-0.99)	(-0.72)	(-1.20)
rFDI	-0.027	-0.054	0.310	0.169	0.202	0.322
	(-0.40)	(-0.85)	(1.19)	(0.68)	(0.74)	(1.14)
DIST	**-0.019	0.007	-0.002	-0.011	-0.015	-0.019
	(2.20)	(0.52)	(-0.11)	(-0.24)	(-1.01)	(-0.59)
BORD	0.013	-0.012	0.036	0.054	****0.980**	****0.869**
	(0.69)	(-0.48)	(0.50)	(0.73)	(2.67)	(2.23)
TC	***-0.013**	0.008	***-0.290**	***1.069**	-0.062	0.004
	(3.11)	(1.13)	(-8.11)	(7.16)	-0.24	0.01
DIST*BORD*TC	0.002	0.001	-0.004	-0.003	***-0.207**	****-0.172**
	(0.68)	0.68	(-0.22)	(-0.20)	(-2.56)	(-2.03)
Year dummies	No	Yes	No	Yes	No	No
Region dummies	No	Yes	No	Yes	No	Yes
Hausman Chi^2	4.68	1.32	1.75	0.60		
Prob chi^2	0.455	0.997	0.883	0.736		
Number of obs.	1134	1134	972	972	162	162
Adj R^2	0.131	0.211	0.079	0.268	0.033	0.069

Dependent variable: Relative regional wages
Disaggregation: NUTS-5 regions.
t-statistics in parentheses; *,** and *** denote coefficient estimates significant at 10, 5 and 1 per cent, respectively.

7 Conclusions

This paper studies the relocation pattern of regional manufacturing in Slovenia over the period of 1994-2000. In the first part of the paper we found a clear pattern of regional relocation of manufacturing activity in Slovenia in terms of manufacturing output and exports. Manufacturing employment, however, did not completely follow this relocation pattern. There is little evidence of the relocation of employment and population between regions, which indicates that declining regions are facing higher unemployment rates. This proposition has also been formally confirmed. Labor markets are clearly not very flexible in Slovenia.

The second part of the present paper attempts to test whether regional development in Slovenia after integration with the EU is progressing according to the predictions of the EG theory. We test the propositions of three competing EG models. Initially, according to the standard EG hypothesis, with no foreign trade, regions closer to the capital city will have a larger concentration of manufacturing activity. After trade liberalization (i.e., economic integration with the EU), a relocation of manufacturing activity should take place. In line with the Krugman (1991) type of EG models, further monotonic reduction of manufacturing activity in more distant regions and further concentration of manufacturing activity in regions closer to the capital region should be observed. The Krugman-Venables type of EG models propose a non-monotonic, U-shaped evolution of relative regional output, i.e., a convergence of relative output should take place after initial divergence. In addition, the Damijan-Kostevc EG model predicts an even more pronounced U-shaped pattern of relocation of relative regional output, since FDI inflows into regions bordering the EU foster quicker adjustment in the EU-bordering regions. We evaluate the above propositions using data on relative regional manufacturing output, FDI and wages in Slovenia. Formal tests, however, find little evidence in favor of any of the competing EG hypotheses. The observed relocation pattern after integration with the EU does not correspond to economic geography predictions. Only in the case of relative regional wages in western/northern regions there is some evidence found in favor of the U-shaped evolution of wages. But this is not represented by the inter-regional relocation of manufacturing towards the western/northern regions. In fact, the observed evolution of relative regional wages might be purely coincidental.

There are two basic explanations for the lack of evidence in favor of any of the economic geography models for Slovenia. The most obvious one is the small geographic size of Slovenia. It is very likely that in such a small country inter-regional transport costs cannot play as important of a role as in countries that are much larger geographically. Second, Slovenia was already relatively open to international trade before 1990. Hence, one could argue that the initial allocation of manufacturing was already, to some extent, dependent on foreign trade considerations. There would then be less scope for the relocation of manufacturing activity than in other transition countries. It remains to be seen, however, whether the predictions of the economic geography models better fit the data for other transition countries that are larger and have regional production structures that have been affected more heavily by integration with the EU.

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