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ECONOMIC STRUCTURE, GROWTH AND CONVERGENCE IN THE MATRIOSCA REGION

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Summary and short version

Objective of this work was the (socio)economic characterization of sub-regions of the MATRIOSCA region at the level NUTS 3, against the background of all other NUTS 3 regions belonging to the five Matriosca states Austria, Croatia, Hungary, Italy and Slovenia (in total 199 regions). The aim was to identify sets of regions which resemble each other in different socioeconomic variables such as economic structure including tourism, density of population, sectoral value added and/or employment shares or in performance variables such as gross regional product both in levels and growth rates. This was done by means of three separate cluster analysis, further questions on convergence and dispersion were then assessed econometrically.

The main questions addressed were:

Economic structure

1. How can the MATRIOSCA sub-regions be classified by given sets of variables (according to different contents such as economic structure and economic development?
2. Can certain classifications explain differences in the growth of gross-regional products over time? Do certain region-types exhibit statistically significant higher growth rates than others?

Economic development and convergence

3. Did development in the MATRIOSCA regions differ from development of the other national regions?
4. Did poorer regions (on average) grow faster than richer regions between 1995 and 2003, and if so, was the (average) grow differential enough for a process of convergence?
5. Was there evidence for economic convergence in the sample of regard, and does the speed of convergence differ for different region types? Did disparities in per capita GDP decline?
6. Are there exemptions from the "general" rule of poorer regions growing faster, and if so, which are they?

The Lisbon Agenda new – focus on jobs and growth

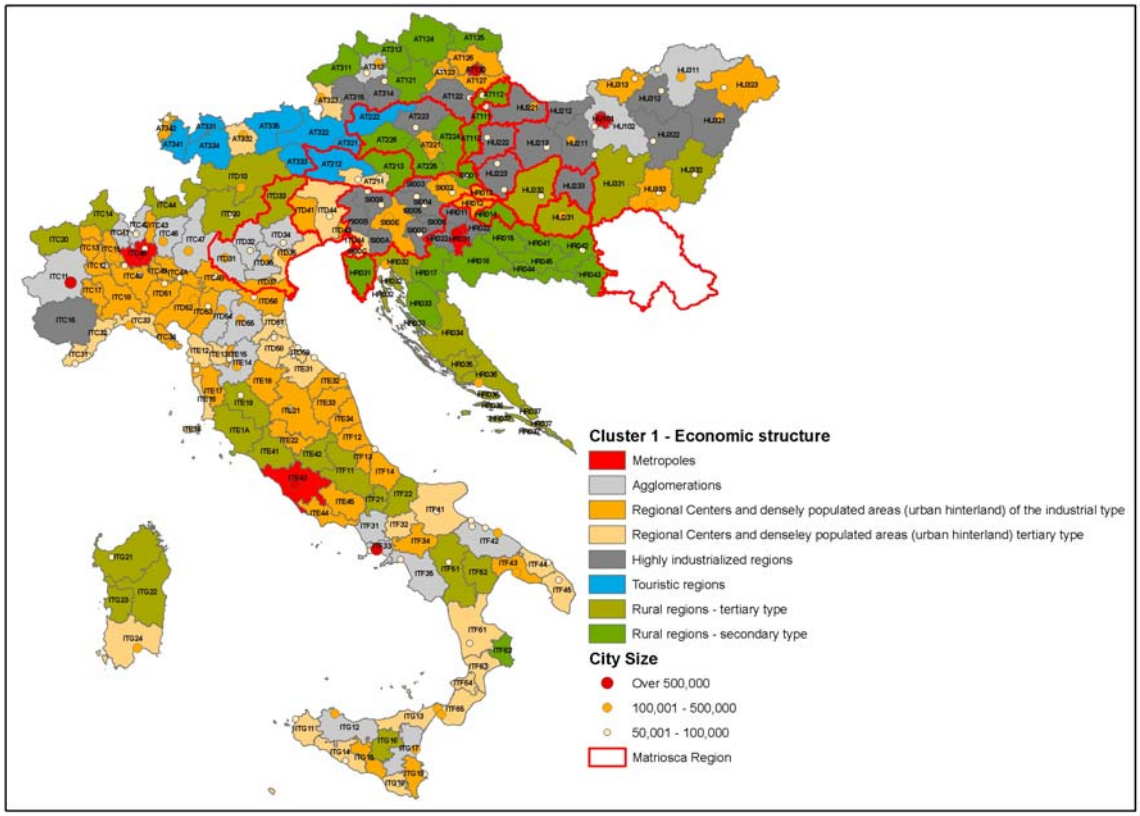
7. How did the Matriosca-regions perform in comparison to other regions when it comes to "evaluating" the new main objectives of the Lisbon-agenda: jobs and growth?

CLUSTER ANALYSIS 1: ECONOMIC STRUCTURE

The first cluster analysis performed in this work was the classification of 199 regions from Austria, Croatia, Hungary, Italy and Slovenia according to their economic structure and their degree of urbanization. By utilizing information from six (only slightly-correlated) variables[1] from the EUROSTAT regional database (which were used in three distinct classification stages) the following eight region types were finally chosen: Metropoles, Agglomerations, Regional Centers and densely populated areas (urban hinterland) of the industrial type, Regional Centers and denseley populated areas (urban hinterland) tertiary type (some touristic), Highly industrialized regions, Touristic regions, Rural regions - tertiary type, Rural regions - secondary type.

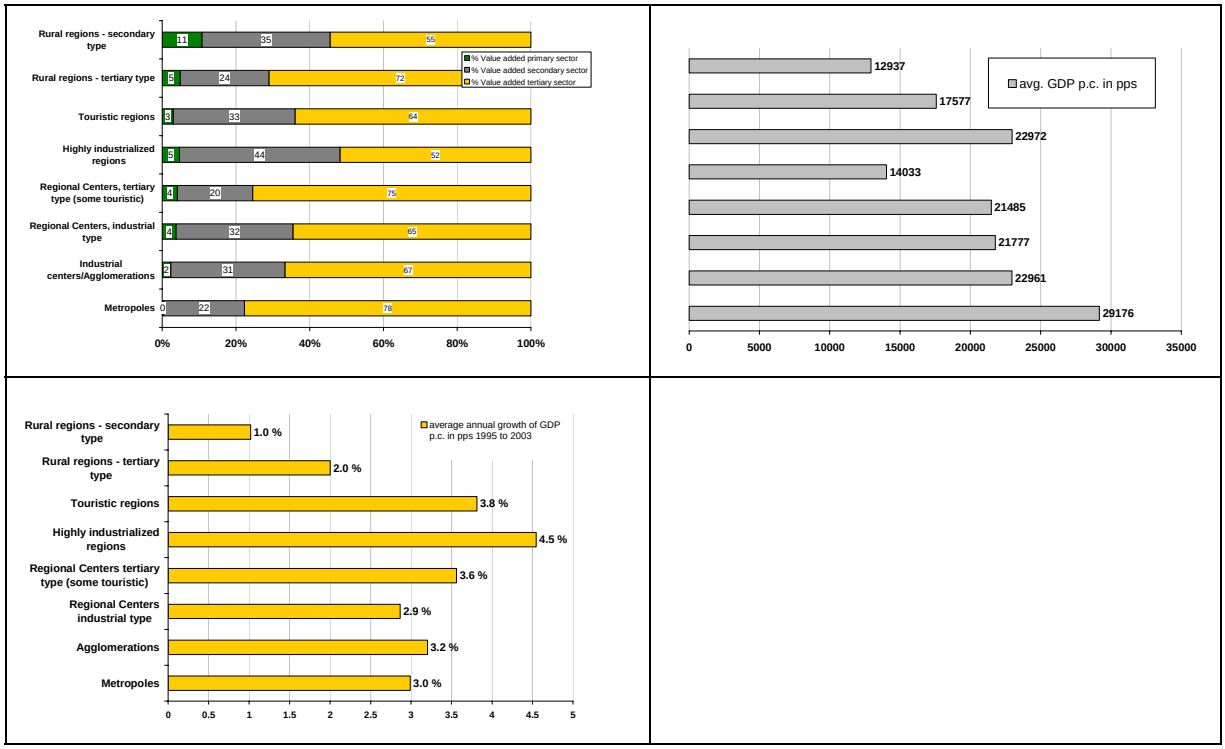
[1] Share of employment in the agricultural sector, population density, share of value added in the secondary sector, beds in hotels per 1000 inhabitants, share of employment in the tertiary sector and habitants.

Figure 1: Results of Cluster Analysis 1 on economic structure



Source: JR-InTeReg

Figure 2: Average of the regional value added shares in the three main sectors in the cluster types and GDP p.c. in PPS



Source: authors calculations, based on EUROSTAT regional data

Figure 2 summarizes the sectoral value added shares and the average GDP p. c. for all of the eight region types. As a general rule GDP per capita (in purchasing power standards) is higher for more urbanized areas, and of course highest in the metropolitan areas. Still, the level of GDP p.c. in pps is highly influenced by the nationality of the regions forming a cluster. For a more detailed statistical description of these clusters, the reader is referred to Figure 15 of the long version. An extensive text-based illustration of these clusters is given in chapter 2.1.

Difficulties which arose in this cluster analysis especially appeared on the one hand while separating urban from non-urban regions. The solution to this resulted in a grey zone of urban- and non-urban regions, which further rather "overestimates" the number of urban regional centers. For example the Matriosca regions of Varazdinska, Pordenone, Udine, Klagenfurt-Villach and Obalno kraska are clearly at the edge of their respective clusters, and the Matriosca region itself contains a relatively high number of regional centers.

On the other hand, the indicator used for tourism: (beds in hotels per 1000 habitants) resulted only in the Austrian (alpine regions) being classified as touristic. These regions are also highly industrialized, (e.g. Palme 1995 mentions that this is due the existence of industrialized main valleys and touristically utilized side-valleys in these regions). A rather similar cluster is formed by these regions on the European level (see Aumayr 2006).

According to the general aim of this cluster-analysis: "to avoid comparing apples and oranges", the Matriosca regions were further compared to their respective group members and to the remaining regions of their national states. This exercise delivered the following main findings:

Matriosca is an industrial region

The Interreg region Matriosca is a conglomerate of all region types existing in the five national states, except the metropolitan areas. Nevertheless, with Vienna, Zagreb and Budapest a triangle of higher level centers is at least relatively close by. In both the urban and the non-urban type of regions, those which are classified as specialized in the secondary sector dominate in the Matriosca region. Above national average value added shares in the secondary sector are to be found in the Croatian, the Italian and the Western Hungarian Matriosca region.

Most of the more service-oriented (some rather touristic) regions are located in "Western Matriosca", from the Italian Adriatic sea cost to the Austrian Alpine regions: Venezia, Trieste, Oberkärnten, Klagenfurt-Villach and Liezen.

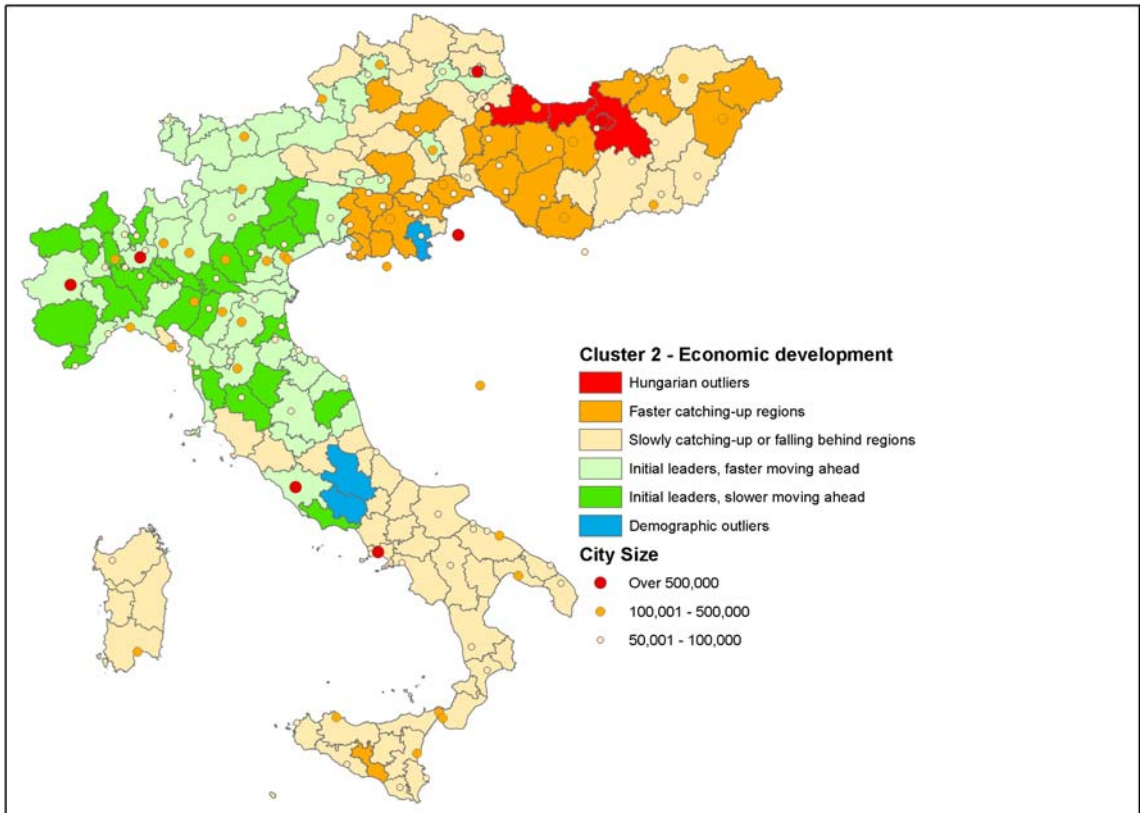
Urban-Rural West-East divide, regional centers in the center

Matriosca's "agglomerations" are the Italian rather urban regions of Verona, Vicenza, Treviso and Padova located at the Western boarder of the Matriosca region. Further regional centers in the Italian part were classified as such due to their generally higher population density. No such degree of urbanization exists in the other parts of Matriosca, though a set of regional centers is scattered in "central Matriosca": Klagenfurt-Villach, Graz, Baranya, Podravska, Obalno-kraska and Osrednjeslovenska. Most of these regional centers are of the industrial or secondary type, some are located "at the edge" of their respective cluster, for being displayed with a huge part of hinterland.

CLUSTER ANALYSIS 2: GROWTH AND ECONOMIC DEVELOPMENT

Under the hypothesis that **richer regions tend to grow slower than poorer regions,** a second cluster analysis was performed in order to better illustrate the regional differences in economic development.. Economic development is characterized here by three variables: 1. (regional) gross domestic product in per capita terms and additionally in purchasing power standards (in order to facilitate interregional comparison between bigger and smaller/richer and poorer regions), 2. growth of the first variable between 1995 and 2003 and 3. growth of economically active population between 1999 and 2003. The analysis yielded 6 different clusters, two of them being a small assembly of outliers: Hungarian outliers, faster catching-up regions, slowly catching-up or falling behind, initial leaders faster moving ahead, initial leaders slower moving ahead and demographic outliers. Roughly speaking, cluster 2 and 3 are the high and less growing still poorer regions while cluster 4 and 5 are the high and less growing richer regions.

Figure 3: Results of Cluster Analysis 2 on economic development



Neighbourhood to Austria and Italy matters for the level of GDP p.c.

The Austrian Matriosca regions are nationally lagging behind, but almost all exhibited higher than average medium term growth rates. Exceptions from this are the rather service and/or touristic oriented regions Klagenfurt-Villach and Liezen. Hungarian regions which are closer to Austria and Slovenian regions which are closer to Italy are generally to be found among the richer regions.

High growth in most of the Matriosca regions except Italy

The main part of the Matriosca regions is located either in a catching-up or the cluster of initial leaders, moving faster ahead (24 of 41 regions). Even those Matriosca regions which are part of cluster three ("slowly catching-up or falling behind regions") are in terms of growth at the "higher end" of this cluster, and therefore (at least slower) catching up. Among the richer "initial leaders, slower moving ahead" Matriosca regions (of Italy) ground was even lost as compared to the group members. Of all regions growth (in terms of GDP p.c in pps) was lowest in Italy, and in Klagenfurt-Villach and Liezen. Growth in the Matriosca region is largely an East-West phenomenon, with the highest growth rates accomplished in the (Western) Hungarian and Slovenian regions.

Regional centers and agglomerations as growth poles?

In Matriosca, the richer regions are in general the more urbanized areas (agglomerations or regional centers). Many of them are situated in Italy: Pordenone, Treviso, Verona and Vicenza, Venezia (and Klagenfurt-Villach) – are all belonging to the more urbanized regions (most being "regional centers") – but most of these regions showed a low growth performance in the period of regard (most of them fall in the cluster of richer regions with lowest growth "initial leaders slower moving ahead") and additionally experienced lower growth of GDP p.c. than the group average.) From the other regional centers only Trieste, Podravska and Osrednjeslovenska showed significantly higher than group average growth rates, in Graz it was slightly higher than average. Hence, the ***Matriosca regional centers are generally no growth poles when compared to other regional centers***[2]. Also in comparison to the national average growth rates, the Matriosca urban areas are mainly below average (Trieste, Podravska and Osrednjeslovenska being again the exceptions).

CLUSTER ANALYSIS 3: THE LISBON OBJECTIVES OF JOBS AND GROWTH

While cluster analysis 2 tried to visualize the hypothesis that richer regions tend to grow slower than poorer regions and identified more distinctly higher and lower growing regions among rich and poor regions from the **economic point of view**, the third cluster analysis rather focuses on **"policy type"** clusters, with objectives derived from the Lisbon Agenda. The main objective of the new interpretation of the Lisbon Agenda is on ***growth and jobs***. Therefore the cluster analysis uses basically the same variables as above, but instead of growth of working age population it uses the growth of total employment between 1995 and 2003[3].

Low growth of employment in the Matriosca region – only some Western regional centres showed higher growth of employment.

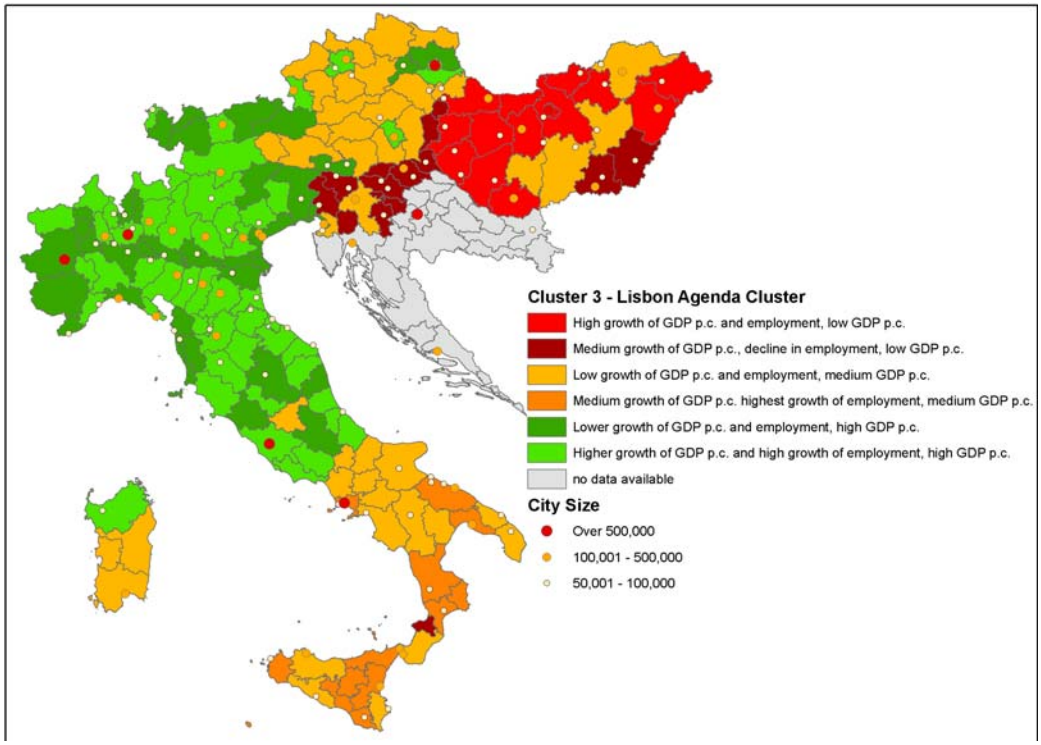
With some Slovenian and Western Hungarian regions, the Matriosca region obtains mainly those regions which showed decline in employment between 1995-2003. Other Slovenian and Austrian regions can be found in clusters with lower growth of employment. Exemptions from this are the regional centres/urban agglomerations of Pordenone, Verona, Vicenza, Treviso, Padova and Graz.

[2] The statement from the SWOT matrix: "Dynamic development of poles across the Matriosca area" should be reconsidered or elucidated.

[3] In our view, growth of employment (measured by the number of workers in a region) is not a good indicator reflecting economic development, as regional differences in the type of labour might spur comparison. Suitable variables would either be the growth of employment in full-time equivalents, or the "volume" of labour, measures in hours. Both variables are not available at this level.

These differences as regards the outcome of cluster analysis 2 can be explained when considering, that growth of employment and growth of economically active population are almost non-correlated. (Pearsons correlation of 0,18, significant at the 0.05 2 tailed level).

Figure 4: Result of the cluster analysis 3 on the objectives of the Lisbon Agenda new



Source: JR-InTeReg

CONVERGENCE AND DISPARITIES

Cluster analysis 2 was an illustration of the questions addressed in the following section: Did the poorer regions of the present analysis grow faster than the richer regions; hence, was there convergence of the level of per capita GDP among the regions? (This question was econometrically assessed by running the so called Barro-regressions on beta-convergence for the whole sample of regions, as well as on clusters of cluster analysis 1. The second concept being addressed is that of sigma-convergence, which basically addresses disparities (of GDP p.c in pps) across the regions. Beta-convergence (poor regions growing faster than rich regions) is a necessary but not sufficient condition for sigma-convergence (less disparities among the regions).

The investigation yielded the following results:

Convergence exists over the whole sample of regions, with a Matriosca-effect of convergence

For all of the regions from the four national states in regard, there is empirical evidence that poorer regions grew faster than richer regions between 1995 and 2003. Especially regions in transition could narrow the gap to the richer regions of Italy and Austria. Furthermore, there is a "Matriosca effect" on the rate of convergence: Without the Matriosca-regions, convergence over the whole sample of regions would have been significantly smaller. This is due to the high growth of (same) of the Hungarian and Slovenian Matriosca regions.

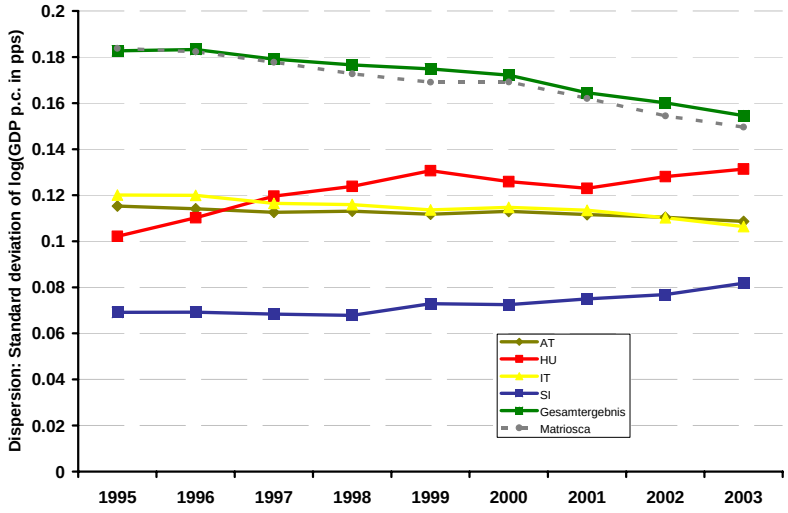
Highest speed of convergence in the highly industrialized regions

The highest speed of convergence is found in the cluster of highly industrialized regions, mainly resulting from the strong appearance of regions in transition in this cluster. This finding is also supported by the results of cluster analysis 2, where most of these regions were located in the "catching-up" cluster. A further research question worth to be addressed is to what extent a regional specialization in the industrial sector is a stronger driver of growth than a regional specialization in the service sector. Obviously, the link between highly industrialized[4] regions and the highest growth performance is not necessarily a causal one, but results from unfolded transitional dynamics: privatization, the restructuring of industries and the orientation to new products and markets. On the other hand, the highest growth performing regions (cluster 1 and 2 of cluster analysis 2) are those which not only experienced the highest absolute growth of value added in the secondary sector, but contrary to the other regions, this was even higher than in the tertiary sector.

Slightly less dispersion of GDP p.c. in the Matriosca regions than over the whole sample of regions.

As Matriosca is comprised of a variety of region types with regions from four national states, the dispersion[5] of per capita income is higher than in most of the clusters of regard. Nontheless, compared to the rest of the regions in the sample (the "Non-Matriosca" regions), the dispersion of per capita income in the Matriosca region is from 1998 onwards always slightly below the dispersion of per capita income of the non-Matriosca regions. Disperson of regional GDP per capita, although generally declining, is widening in Hungary and Slovenia. The statement from the SWOT "raising imbalance between the development dynamics in growth poles and laggard areas" should be understood against the background of these findings.

Figure 5: Development of Regional Disparities of GDP p.c. in pps



Source: authors calculations, based on EUROSTAT regional data

[4] Highly industrialized regions as identified in cluster analysis 1 exhibit the highest share of value added of all clusters (on average 44 %),

[5] As a measure for dispersion the standard deviation of GDP pc. in pps is used.

1 Purpose, Method and Scope of the Analysis

Objective of this work is the (socio)economic characterization of sub-regions of the MATRIOSCA region at the level NUTS 3, against the background of all other NUTS 3 regions belonging to the five Matriosca states Austria, Croatia, Hungary, Italy and Slovenia (in total 199 regions). The aim is therefore to identify sets of regions which resemble each other in different socioeconomic variables such as economic structure including tourism, density of population, sectoral value added and/or employment shares or in performance variables such as gross regional product both in levels and growth rates.

The main questions to be posed will be:

8. How can the MATRIOSCA sub-regions be classified by given sets of variables (according to different contents such as economic structure and economic development?
9. Can certain classifications explain differences in the growth of gross-regional products over time? Do certain region-types exhibit statistically significant higher growth rates than others?
10. Did development in the MATRIOSCA regions differ from development of the other national regions?
11. Was there evidence for economic convergence in the sample of regard, and does the speed of convergence differ for different region types? Did disparities in per capita GDP decline?

The structure of this work is as follows:

In chapter 2 a first classification of regions according to their economic structure is performed by means of a multivariate statistic technique, a so called "cluster analysis"[6]. In chapter 3 this exercise is repeated with variables addressing economic development and performance. In both chapters not only the cluster types are described, but the group results for all of the 45 Matriosca subregions are discussed. Chapter 5 adresses some hypotheses on convergence and the development of regional disperson by running econometric regressions. The summary (at the beginning of the document) concludes and gives a short executive summary of the findings.

[6] For a detailed methodological description see for example Backhaus et al. (2000)

2 Cluster analysis 1 on economic structure and urbanization

2.1. MAIN RESULTS AND DESCRIPTION OF CLUSTERS

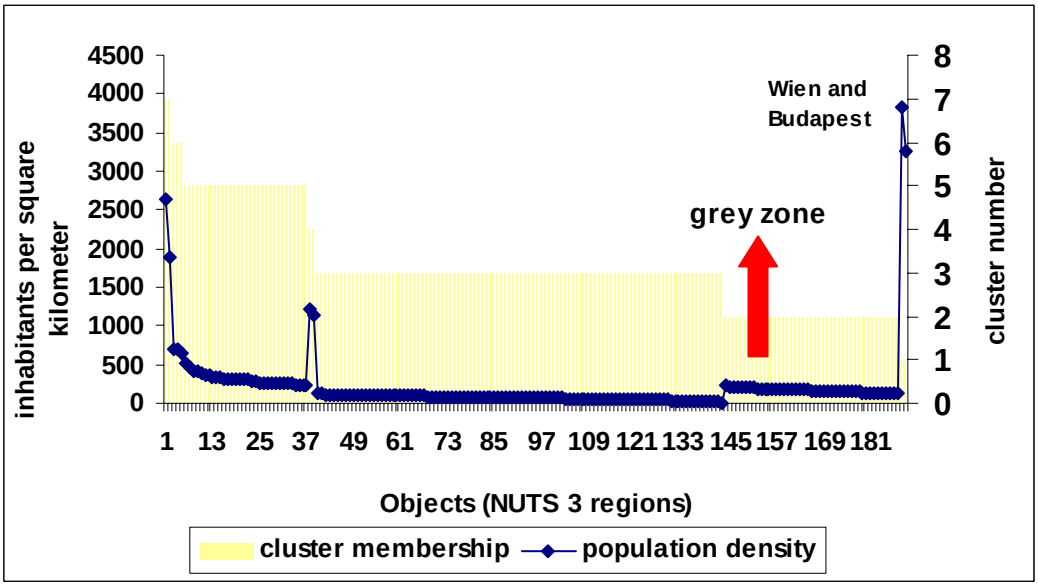
Cluster analysis in short is a statistical method for grouping a set of objects into more homogenous groups (for a methodological introduction see for example Backhaus et al, 2000). Comparison of a group member only to the other members of this groups rather than to the whole average is therefore a good means to compare only similar objects. In regional economics cluster analysis is often used to classify regions which are similarly endowed with growth factors (Kronthaler 2003), resembling each other in their economic structure (Palme 1995, Prettenthaler 2004) and in spatial respects (Aumayr 2006a,b), or in other dimensions such as sustainable growth (Bauriedl/Winkler 2004) or labour market issues (Blien et al 2006)

The aim of the first cluster analysis was to characterize the regions both by their economic structure together with their degree of urbanization. The dual content of this analysis, reflected in two sets of variables (economic ones such as sectoral employment, value added and tourism and geographic variables such as population density and inhabitants), required the analysis to be conducted in further steps: First of all, the full sample of regions was divided into groups of urban and non-urban areas. Extracting factors of subsets of the before-mentioned variables[7] by principal component analysis and using the extracted factors in a cluster analysis which should yield urban- and non-urban did not yield intuitive results. For this reason, the decision whether to classify a region on the urban-non-urban scale was performed solely by clustering all regions according to their density of population. Regions belonging to the "grey zone" between "pure cities" as NUTS 3 regions and all other regions were subsequently considered in both cluster analysis on non-urban and urban areas.

Figure 6 illustrates the difficulty of this classification. Beside the "outliers" of the Metropolitan regions Budapest, Napoli, Milano, Roma, Vienna and Zagreb and the cities of Trieste, Prato and Varese most other regions do not exhibit more than 500 habitants per square kilometre, and a decision whether or not a region is urban or not is still rather difficult. In the grey zone both cities with their hinterland, as well as a more densely populated hinterland itself can be found.

[7] Population density, inhabitants, share of value added in the service sector, in several cases also GDP per capita in pps and GDP per capita in pps with respect to the national average were used.

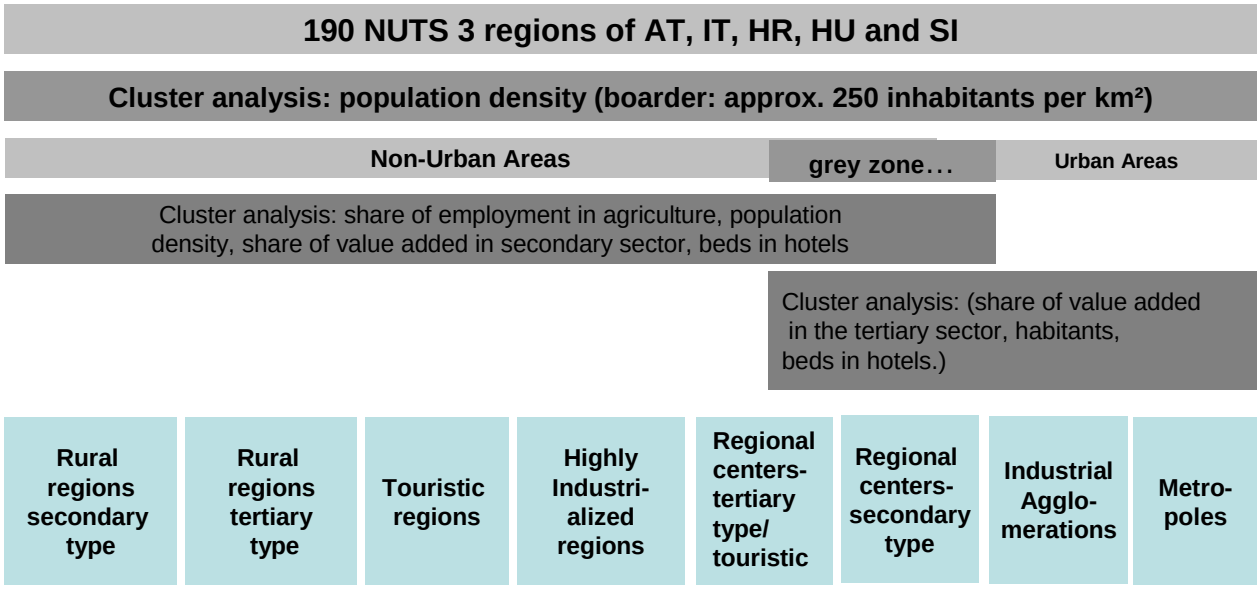
Figure 6: Clusteranalysis of urban and non-urban areas



Source: JR-InTeReg, data from EUROSTAT

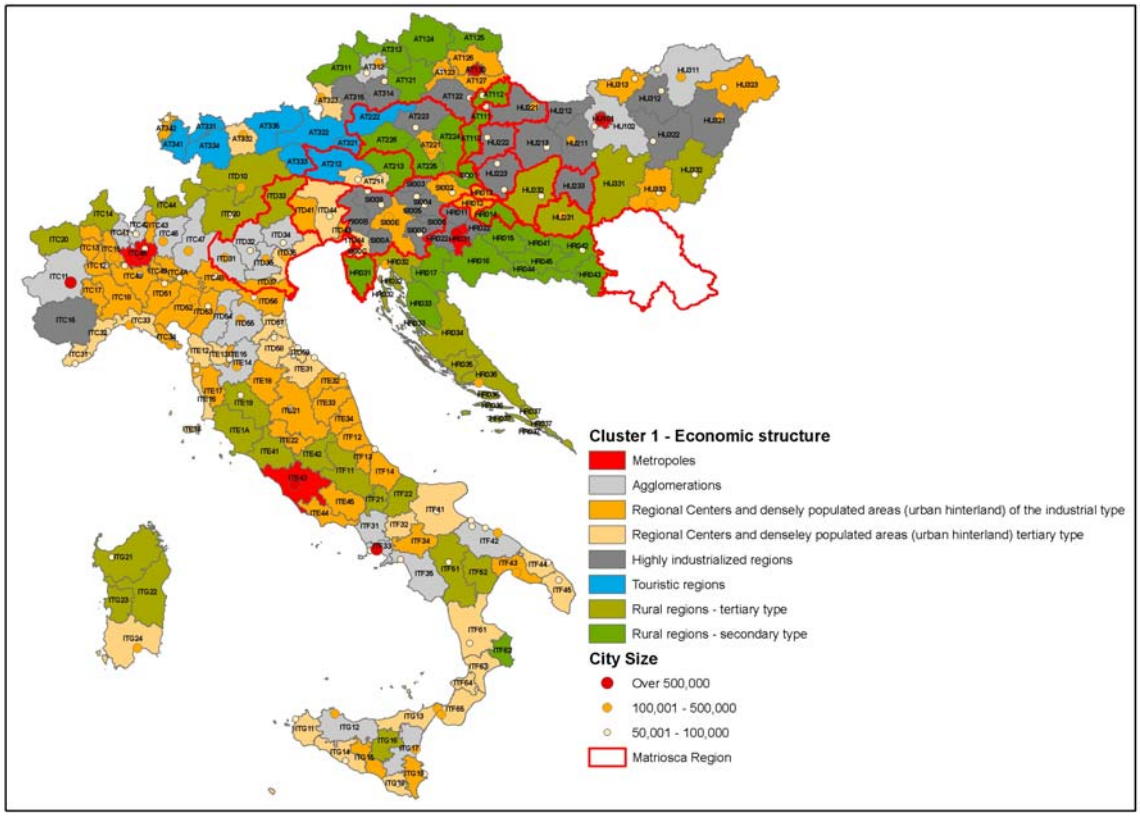
In a further step, all the objects of this grey zone were combined with the non-urban areas. The subsequent cluster analysis of non-urban areas (including the variables population density, share of employment in the primary sector, share of value added in the secondary sector and beds in hotels and similar establishments per 1000 inhabitants) yielded four final groups of non-urban region types and one "regional center" grey-zone group which itself was reclustered together with the urban-objects. The cluster analysis of the urban regions, including the share of gross value added in the tertiary sector, the number of habitants as well as beds in hotels per 1000 habitants resulted in three urban clusters: regional centers of the secondary and tertiary type together with industrial agglomerations (which are especially classified by their huge number of inhabitants.) Note: Croatian regions were classified separately for reasons of data availability in similar analysis, and then assigned to the most suitable cluster. In the annex detailed descriptive statistics on the cluster analysis are available.

Figure 7: Structure of work and results of the cluster analysis:



Metropoles
The smallest cluster of all comprises the cities (regions) of Budapest, Napoli, Milano, Roma, Vienna and Zagreb. These regions exhibit employment and value added shares of 79 percent on average which is the highest amongst all regions. The number of habitants lies between 3.7 million and 780.000.
Agglomerations
The 20 regions belonging to this cluster are at the same time densely populated, with a high number of inhabitants (ranging between 2.1 million and 0.5 million), and exhibit high shares of employment and value added in the secondary sector.
Regional centers secondary type
These regions are on average smaller in terms of inhabitants as compared to the former group, but are still relatively densely populated on average. Though, as with the second type of regional centers, Their share of employment in the secondary sector ranges between 50 and 20 %, value added between 45 and 22 %.
Regional centers/tertiary type
This cluster is also formed by regions in which (mostly smaller) cities are displayed with their hinterland. These regions distinguish themselves from the non-urban tertiary type regions by their higher shares of employment and value added in the service sector, mainly caused by the regional city's role as service center and public administration location for the surrounding regions. Some of the regions in this cluster are also touristic locations, such as Salzburg, Rimini or Venezia. Interestingly for some of these regions agriculture is still an important factor, especially for those located in Southern Italy.
Highly industrialized regions
These regions exhibit the highest shares of industrial employment and value added amongst all regions, ranging between 52 and 30 %. Population density is on average substantially lower than in the previously discussed clusters. Regions of this cluster are especially located in Hungary and Slovenia, the industrial heritage of the communist system.
(Alpine) Touristic regions
In these regions the high number of beds in hotels per capita dominates all other structural variables, on average 318 beds per 1000 habitants can be found there. Most of the touristic regions are located in Alpine Austria.
Rural regions tertiary type
These regions are sparsely populated. The service sector dominates in these regions, with value added shares between 60 and 80 %. Some of these regions are also quite touristic, but resemble in terms of all the other variables used for classification rather the regions of the cluster at hand than the (mainly Austrian) touristic regions. Agriculture is – especially given the rural locations – not exceptionally important for these regions in terms of employment and value added shares. (The median regions exhibit shares of 8 and 4 % respectively.)
Rural regions secondary type
In contrast to the former rural group, agriculture in these regions is very important sector in terms of employment shares, lesser in terms of value added. A high share of value added of 35 % is generated in the secondary sector. GDP measured in purchasing power parity is lowest amongst all regions and lies at approx. 13.000 Euro per capita.

2.2. RESULT OF THE CLUSTER ANALYSIS FOR THE MATRIOSCA-REGIONS



Source: JR-InTeReg

As the map shows, all types of regions but the metropolitan areas appear in the Matriosca area, but with Zagreb, and its 780.000 inhabitants, a capital city and higher level center is close by. Generally speaking, the degree of urbanization is higher in Western-Matriosca, with the Italian regional centers and agglomerations (Padova, Verona, Treviso, Vicenza, Udine, Pordenone, Rovigo, Vicenza, Gorizia) being relatively densely populated areas.

The next steps of the analysis will be as follows: first of all the Matriosca regions will be compared to the average of their respective group members, at last the same will be done with respect to national average.

2.2.1 Comparison of the Matriosca regions with their respective groups

Group	Matriosca regions	Comparison with group average
Industrial centers/agglomerations	Padova, Verona, Treviso, Vicenza	Smaller and less densely populated regions than avg. in terms of inhabitants, above average GDP p.c. (in pps) both in 95 and 03; lower than average growth (except Padova). Treviso and Vicenza are to a higher extent industrialized than the other group members.
Regional centers, industrial type	Medimurska zupanija, Varazdinska zupanija, Osrednjeslovenska, Podravska, Graz, Udine, Rovigo, Gorizia, Pordenone	Except Podravska, Varazdinska and Medimurska, the other group members have higher than average GDP p.c. (in pps), reaching to 140 % in Graz and 120 % in Udine and Pordenone. Lower than average growth in the "old" EU member states regions. Higher degree of industrialization in Medimurska and Varazdinska, lower in Gorizia and Osrednjeslovenska. Given their lower density of population, the regions Varazdinska, Pordenone and Udine, are located "at the edge" of this cluster.
Regional centers, tertiary type	Obalno-kraska, Trieste, Klagenfurt-Villach, Venezia	Also at the edge of their group as regards density are Klagenfurt-Villach and Obalno-kraska, whereas deviation from the group mean as far as employment in the service sector is concerned is not as high. Trieste, being displayed with much less hinterland as the other regions in NUTS 3 shows 9 %-points higher value added share and 12 % higher employment share in the service sector than the group average. Lower than average GDP p.c. (in pps) only in Obalno-kraska, while growth between 95 and 03 was higher (as well as in Trieste).
Highly industrialized regions	Gyor-Moson-Sopron, Zala, Vas, Jugovzhodna Slovenija, Notranjsko-kraska, Koroska, Goriska, Gorenjska, Östliche Obersteiermark, Spodnjeposavska, Savinjska, Zasavska, Tolna	Above group average higher GDP p.c. (in pps) 2003 in Gorenjska, Savinjska, Jugovzhodna Slovenija, Gyor-Moson-Sopron, Goriska, highest in Östliche Obersteiermark. All but Zasavska and Tolna had higher than average growth rates of GDP p.c, the latter region is the one which deviates most negatively from the group average of value added shares in the industrial sector.
Touristic regions	Oberkärnten and Liezen	Given the small size of the cluster of touristic regions, comparison with the average is not very meaningful. Though, in contrast to the other (Alpine) touristic regions, GDP p. c. is lower in the two Matriosca regions, and so is the share of value added and employment in the service sector.
Rural regions, tertiary type	Baranya, Somogy, Belluno	Belluno has an above average GDP p.c. in pps, and much higher shares in the industrial sectors. Baranya and Somogy lag behind the other group members, but growth of GDP p.c. in pps was substantially higher (on average between 95 and 03 additional 3,9 and 3,3 percentage points.
Rural regions, secondary type	Istarska zupanija, Koprivnicko-krizevacka zupanija, Mittelburgenland, Unterkärnten, Südburgenland, Nordburgenland, West- und Südsteiermark, Oststeiermark, Pomurska, Westliche Obersteiermark	Pomurska and Koprivnicko-krizevacka have lower than average GDP p.c. in pps, the Austrian regions as well as Istarska are above. The share of value added in the secondary sector is high above the group average in Unterkärnten, Mittelburgenland and Westliche Obersteiermark, wheres it is much lower in Nord- and Südburgenland. All of the Matriosca regions in this cluster experienced higher than average annual growth of GDP p.c. between 95 and 03.
		Note: data for average growth rates in the medium term (95-03) was not available for the Croatian regions.

2.2.2 Comparison of the Matriosca regions with their national states regions

Country	Regions	Variable	Comparison with national[8] average
Austria	Mittelburgenland, Östliche Obersteiermark, Unterkärnten, Südburgenland, Nordburgenland, West- und Südsteiermark, Oststeiermark, Oberkärnten, Westliche Obersteiermark, Graz, Liezen, Klagenfurt-Villach	GDP p.c. in pps	All but Graz and Klagenfurt-Villach below average.
		Average annual growth rate of GDP p.c. in pps between 95 and 03	Almost all above average, except Klagenfurt-Villach and Liezen. This generally reflects the catching-up process of the southern Austrian regions to the national average.
		Employment shares	Much higher than average employment share in the industrial sector in Östliche Obersteiermark and Unterkärnten. Employment in the service sector is much higher in the regional centers Graz and Klagenfurt-Villach.
		Value added shares	Much higher than average value added shares in the industrial sector in Östliche Obersteiermark and Unterkärnten, Mittelburgenland, Westliche Obersteiermark, West- und Südsteiermark- this is also reflected in the cluster analysis.
Croatia	Medimurska zupanija, Varazdinska zupanija, Istarska zupanija, Koprivnicko-krizevacka zupanija	GDP p.c. in pps	Above national average GDP p.c. in pps in all Matriosca regions but Medimurska (92 %), high above average in Istarska (157 %).
		Value added shares	All of the Croation Matriosca regions are much stronger specialized in the secondary sector than the National average.
Hungary	Gyor-Moson-Sopron, Zala, Vas, Baranya, Somogy, Tolna	GDP p.c. in pps	The three neighbour regions being close to Austria Gyor-Moson-Sopron, Zala, Vas are high above the national average, the others below.
		Average annual growth rate of GDP p.c. in pps between 95 and 03	In contrast to the Austrian Matriosca regions, rather a widing of regional disparities seemed to occur in the six Hungarian Matriosca regions: The poorer regions Baranya, Somogy and Tolna experienced lower than national average growth rates.
		Employment shares	In the three "eastern" regions the employment share in agriculture is higher than the national average, and lower in the industrial sector, where Tolna deviates least of all from the national average. The Western Hungarian regions show the converse pattern.
		Value added shares	The below/above average pattern as concerns employment shares also applies to value added shares.
Italy	Trieste, Padova, Udine, Rovigo, Gorizia, Venezia, Verona, Belluno, Pordenone, Treviso, Vicenza	GDP p.c. in pps	Given the high North-South disparities of the Italian regions, the Italian Matriosca regions all obtain a per capita GDP of 10 to 32 % above average, with Rovigo being the exception with a GDP p.c. exactly in the Italian

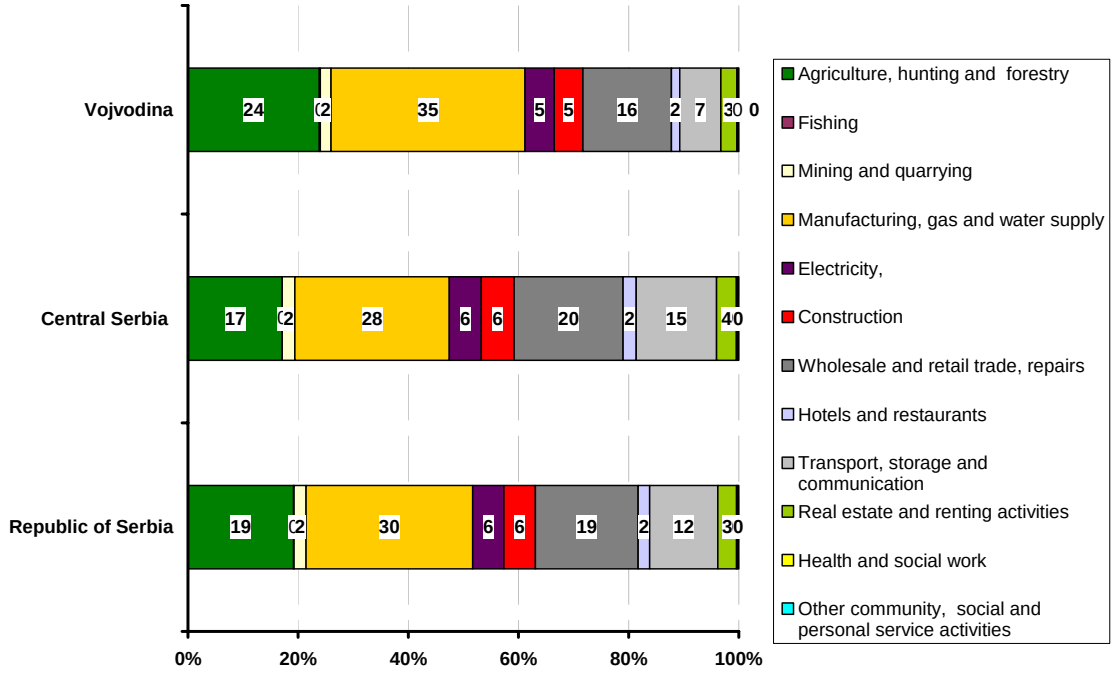
[8] Average of all (national) regions analyzed in the cluster analysis.

Country	Regions	Variable	Comparison with national[8] average
			average, and therefore relatively poor for the Northern location.
		Average annual growth rate of GDP p.c. in pps between 95 and 03	Only Trieste showed a significantly higher than average growth rate of GDP p.c., the other regions slightly below average.
		Employment shares	In the Italian Matriosca regions, less people are working in the primary sector than on average, but many more than average in the industrial sector. (This is not true for Trieste and Venezia, though the latter does not deviate too much from the national average.)
		Value added shares	The below/above average pattern as concerns employment shares also applies to value added shares.
Slovenia	Osrednjeslovenska; Obalno-kraska; Goriska; Jugovzhodna Slovenija; Savinjska; Gorenjska; Podravska; Spodnjeposavska; Koroska; Notranjsko-kraska; Zasavska; Pomurska	GDP p.c. in pps	The national average is dominated by the three regions Osrednjeslovenska; Obalno-kraska; Goriska

2.2.3 Excursus: Vojvodina

As data available for the Vojvodina were not sufficient to implement the region into the cluster analysis, its structure and development, especially in comparison to the whole Republic of Serbia will be described separately. With a regional population of 2.030.218 in 2003 the region of Vojvodina is furthermore not comparable to the Nuts 3 regions analyzed in this work. While population remained roughly constant between 1995 and 2003, it decreased until 2005 by 17.300 or by -0,9 %. The Vojvodina inhabits approximately 27 % of Serbia's population, but generates slightly more than 30 % of Serbia's GDP[9], and 33 % of Serbias' industrial production. Vojvodina's economy is – with a sectoral share of 24 % of GDP[9] far more dominated by the primary sector than central Serbia. Also its share of manufacturing is with 35 % of GDP substantially higher than that of Central Serbia (28 %). The latter on the other hand obtains higher shares in trade and transport. Voyvodina's rate of economically active population is slightly lower than Central Serbias'.

Figure 8: Sectoral shares of gross material product in Serbian regions:



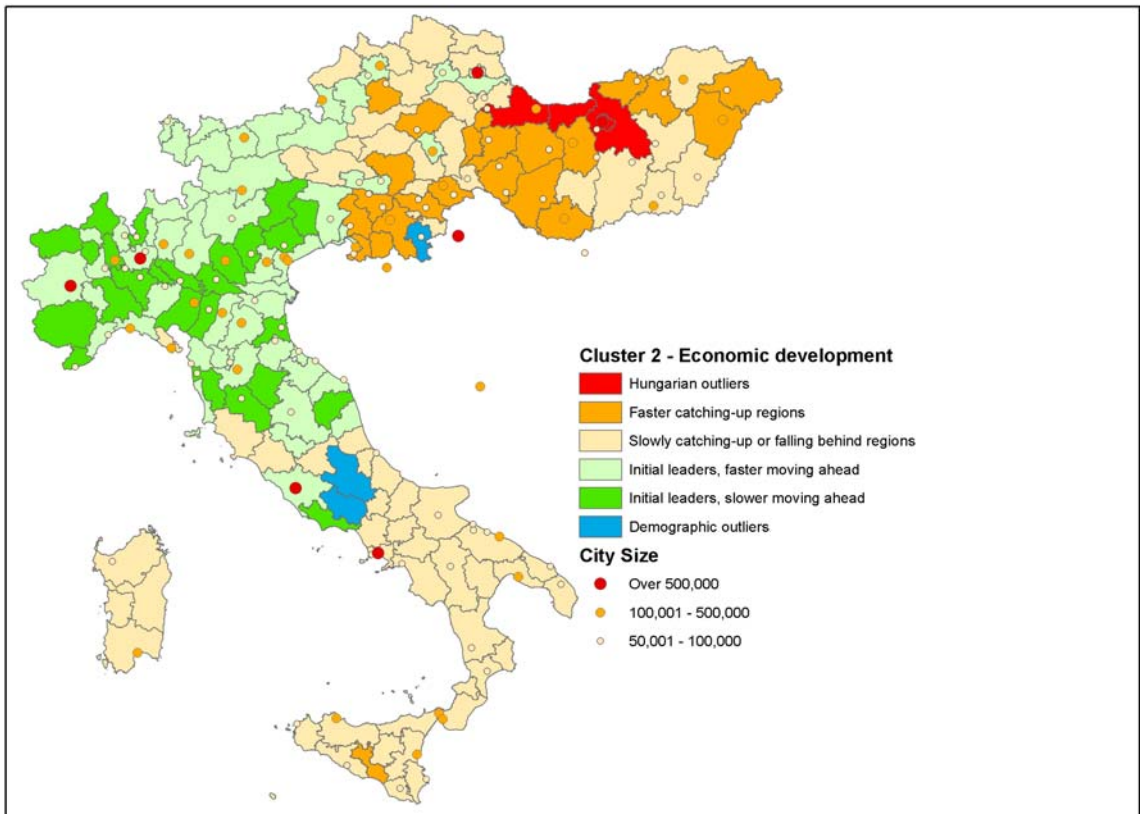
Source: Republic Statistical Office of Serbia (2004), p.11

[9] Gross domestic (material) product, in 2002 at current prices. Republic Statistical Office of Serbia (2004), p.11

3 Cluster analysis 2 on economic development

Under the hypothesis that richer regions tend to grow slower than poorer regions, a second cluster analysis was performed in order to better illustrate the regional differences in economic development. Economic development is characterized here by three variables: 1. (regional) gross domestic product[10] in per capita terms and additionally in purchasing power standards (in order to facilitate interregional comparison between bigger and smaller/richer and poorer regions), 2. growth of the first variable between 1995 and 2003 and 3. growth of economically active population between 1999 and 2003[11][12].. As the third variable is highly correlated with growth of population, this measure is at the same time an indicator for demographic development. The analysis was performed using these variables across the whole sample of regions. Croatia had to be left out because of the following considerations: a time series for the first two of these variables was available only from 1999 to 2003. Including Croatia by reducing the time series for the other regions to these four years would have made analysis too arbitrary, as the short time series might interfere too much with business cycles, such that interpretations of catching-up or falling behind might become coincidental.

Figure 9: Result of the cluster analysis 2 on economic development



Source: JR-InTeReg

[10] Gross value added (GVA) and gross regional product (GRP) are both measures for the economic power of a region. The difference lies only in the net of taxes and subsidies. While in the first cluster analysis GVA was utilized because it is available sectorally, the second analysis uses GRP instead, because it is available in purchasing power parities, thus facilitating interregional comparison.

[11] The shorter time period results from data availability.

[12] In our view, growth of employment (measured by the number of workers in a region) is not a good indicator reflecting economic development, as regional differences in the type of labour. Suitable variables would either be the growth of employment in full-time equivalents, or the "volume" of labour, measures in hours. Both variables are not available at this level.

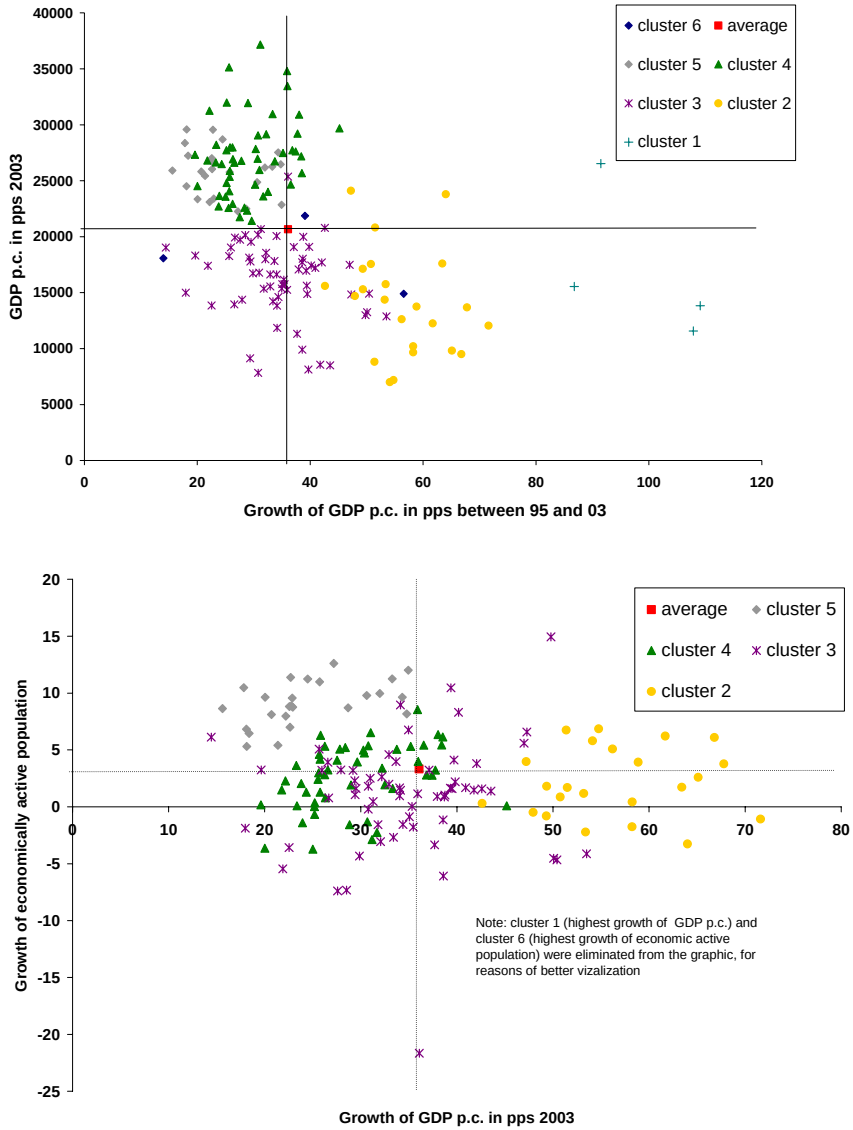
3.1. MAIN RESULTS AND DESCRIPTION OF CLUSTERS

The analysis yielded six different groups of clusters, two of them (number one and number six), being smaller groups of outliers. These clusters are in turn described by means of the main variables used for classification, and by additional variables when rather homogeneous behaviour was found. For better illustration of the location of the clusters in the plot of the three variables used for classification, Figure 10 gives two combinations of the variables.

Cluster 1: Hungarian outliers
This cluster only consists of Hungarian outliers (Pest, Komárom-Esztergom, Gyor-Moson-Sopron and Budapest), resulting from the highest growth rates of per capita GDP. Part of this growth might be explained by the Hungarian recession in the beginning of the period, nevertheless, this cannot account for the whole growth. Three of the four outliers are still below total average as far as the level of GDP p.c is concerned, but with a median GDP of 14.700, these regions are on their way to catching up to the economic power of the richer regions. In two of these regions (Pest and Komárom), economic growth was paralleled by high growth in the active labour population. Furthermore, on average growth was to a higher extent driven by growth of value added in the secondary sector (which is only true for this cluster).
Cluster 2: Faster catching-up regions
Cluster 2 contains those regions that on average where and still are the poorest regions, but in contrast to cluster 3, these regions exhibited higher than average growth of GDP p.c. and are thus on their way to catching up. At the same time, most of these regions experienced an outflow of population and a decline in the economically active population, the others only slight growth of these measures. Accordingly, part of the growth in per capita GDP must be attributed to the decline in population. Most of the regions in this cluster are situated in (Western) Hungary and Slovenia, and all coincide with either of the four industrial type-regions of cluster analysis 1. The regions of this cluster experienced high growth of value added in the secondary sector, on average almost as high as in the tertiary sector.
Cluster 3: Slowly catching-up or falling behind regions
GDP per capita in pps. in 2003 is on average comparable to that of the previous clusters (with a relatively high deviation in all three cases), though, regions belonging to cluster 3 started on average on a higher level of GDP p.c. in 1995 (still much lower than that of the following clusters). Growth of GDP per capita scatters around average, so regions of this cluster are either slowly catching-up or falling behind. Both, geographically and in terms of economic structure as defined in cluster analysis 1, this cluster is the most heterogeneous, containing basically Southern Italian, Eastern Austrian and Central Hungarian regions.
Cluster 4: Initial leaders, faster moving ahead
Regions belonging to cluster four are and where on average the richest in terms of per capita GDP in pps. (In fact, $4/5^{th}$ of the regions belonging to this cluster are urban areas, or belong to some of the regional centers identified above). Growth in these regions was second lowest of all clusters, but as Figure 11 clearly shows, the initial lead in GDP p.c. was high enough, to preserve the overall situation. In these regions, growth was to a higher extent induced by growth of value added in the tertiary sector. The members of this cluster are located in Western Austria and Northern Italy.

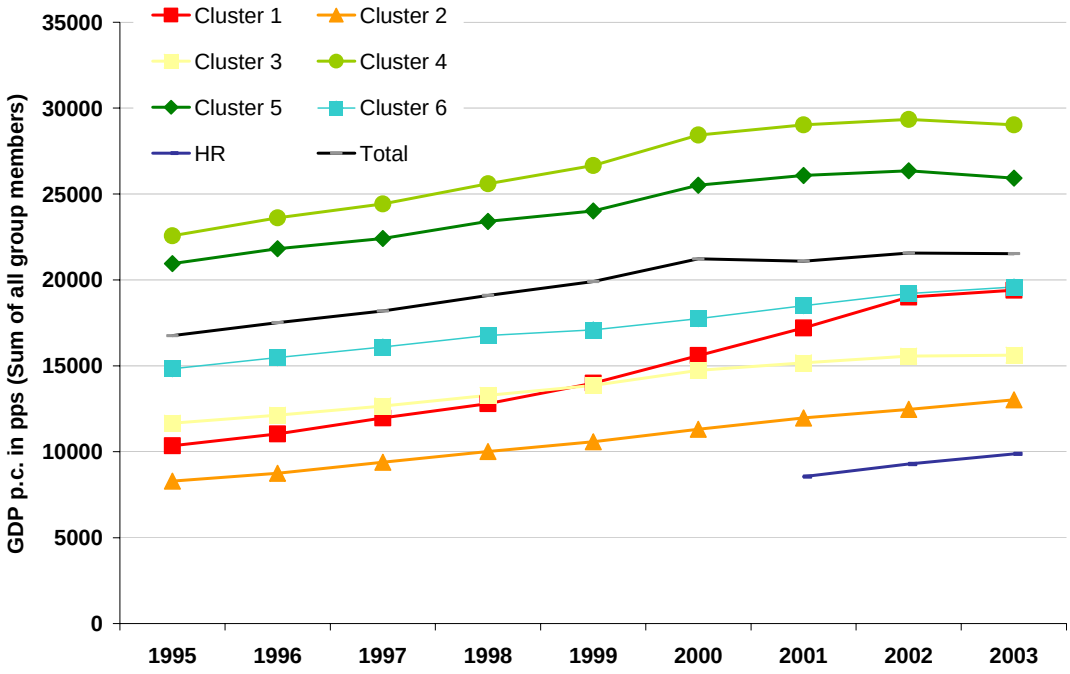
Cluster 5: Initial leaders, slower moving ahead
Members of this cluster have above average GDP p.c., both in 1995 and 2003, but given their lower growth rates, the gap to the leading regions has widened in the period of concern. What further distinguishes these regions from the former group is their higher growth of economically active population. Growth of GDP p.c. was to an even higher extent driven by growth of the tertiary sector than in the previous cluster.
Cluster 6: Demographic outliers
These three outliers (Frosinone, L'Aquila and Jugovzhodna Slovenija) form a separate cluster, because of their high growth of economically active population according to Eurostat data (much lesser growth of inhabitants), ranging between 23 and 30 percent in the period of consideration. Resulting is a high growth of GDP per capita.

Figure 10: Growth plots of the regions of the cluster analysis (GDP p.c. in pps in 2003(growth of economically active population) vs. growth of GDP p.c. between 1995 and 2003



Source: Eurostat data, own calculations

Figure 11: Development of GDP p.c. in pps, (as the sum of all group members)



Source: Eurostat data, own calculations

3.2. RESULT OF THE CLUSTER ANALYSIS FOR THE MATRIOSCA-REGIONS

3.2.1 Comparison of the Matriosca regions with their respective groups

Group	Matriosca regions	Comparison with group average
1 Hungarian outliers	Gyor-Moson-Sopron	GDP p.c. in pps approximately in the group average, growth slower than in the other regions.
2 Faster catching-up regions	Baranya, Gorenjska, Goriska, Mittelburgenland, Notranjsko-kraska, Obalno-kraska, Os-rednjeslovenska, Östliche Ober-steiermark, Podravska, Savinjska Somogy, Südburgenland Unterkärnten, Vas, Zala	Hungarian regions below group average as concerns GDP p.c. in pps. Growth of value added in secondary and tertiary sector below average in Unterkärnten, Südburgenland and Östliche Obersteiermark and Mittelbur-gendland. Except the last region mentioned, growth of GDP was also below group average in these regions.
3 Slowly catching up or falling behind regions	Koroska, Liezen, Nordburgenland Oberkärnten, Oststeiermark, Pomurska, Spodnjeposavska, Tolna, West- und Südsteiermark, Westliche Obersteiermark, Za-savska	Similar to the cluster above, the Austrian regions are above the group average in terms of GDP per capita, but except Liezen and Tolna, growth of GDP p.c. was higher than (or at least equal to) the group average in all of the Matriosca regions of this cluster. So, these regions belong to those members of cluster three which are slower in catching up (and not falling behind).
4 Initial lead-ers, faster moving ahead	Gorizia, Graz, Klagenfurt-Villach, Padova, Rovigo, Trieste, Udine, Venezia	Except Gorizia and Rovigo, all the other Matriosca regions of this cluster are in or above group average as far as GDP p.c. is concerned. Growth of GDP p.c. was significantly higher than group average only in Graz and Trieste. All of these regions belong to some type of regional centers as identified in cluster analysis 1. Growth of value added in the secondary sector was significantly higher than group average in Padova and Trieste, and only Udine showed a higher than group average growth of economi-cally active population.
5 Initial lead-ers, slower moving ahead	Belluno, Pordenone, Treviso, Verona, Vicenza	Being already located in the cluster of the least growth performance, all of these Matriosca regions even showed lower growth of GDP p.c. in pps than the group average. As far as the level of GDP p.c. is concerned, all of these regions are in or slightly above group average in 2003, but lost ranks in group as compared to 1995. Growth of value added in the secon-dary sector deviated positively from group average only in Verona.
6 Demo-graphic out-liers	Jugovzhodna Slovenija	-

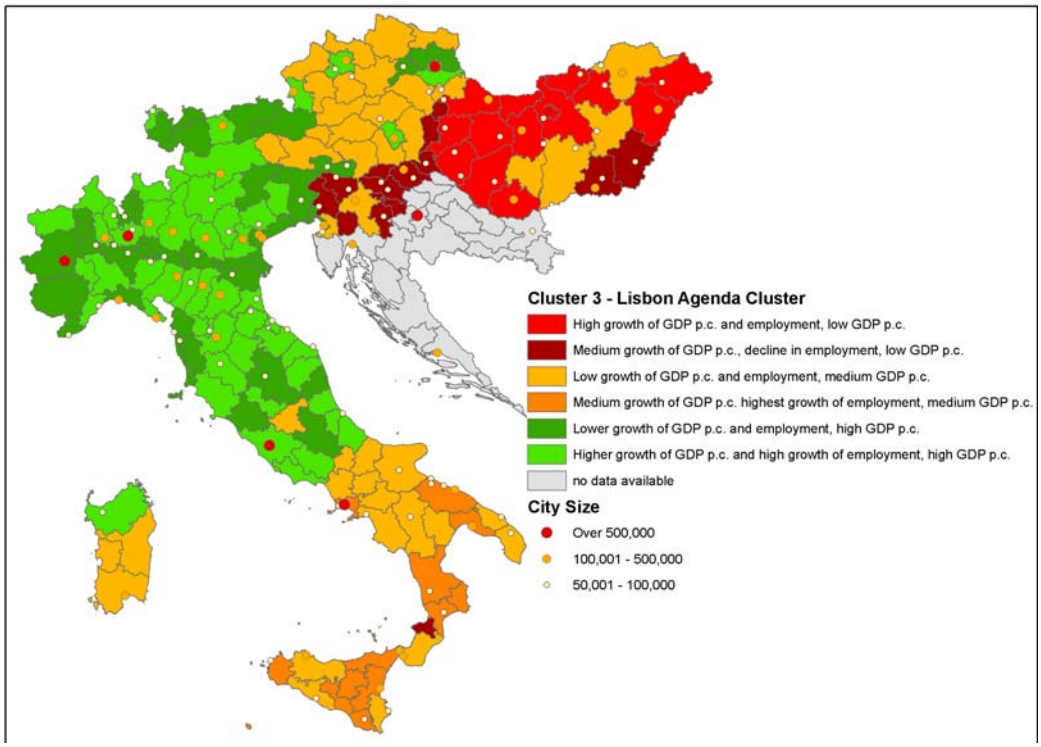
4 Cluster analysis 3 on the objectives of Lisbon New

While cluster analysis 2 tried to visualize the hypothesis that richer regions tend to grow slower than poorer regions and identified more distinctly higher and lower growing regions among rich and poor regions from the **economic point of view**, the present cluster analysis rather focuses on **"policy type"** clusters, with objectives derived from the Lisbon Agenda. The main objective of the new interpretation of the Lisbon Agenda is on ***growth and jobs***. Therefore the cluster analysis uses basically the same variables as above, but instead of growth of working age population it uses the growth of total employment between 1995 and 2003[13].

Figure 12 depicts the results of the analysis, the legend already gives a short description of the groups, further statistics are available in Figure 17 in the annex.

With some Slovenian and Western Hungarian regions, the Matriosca region obtains mainly those regions which showed decline in employment between 1995-2003. Other Slovenian and Austrian regions can be found in clusters with lower growth of employment. Exemptions from this are the regional centres/urban agglomerations of Pordenone, Verona, Vicenza, Treviso, Padova and Graz.

Figure 12: Result of the cluster analysis 3 on the objectives of the Lisbon Agenda new



Source: JR-InTeReg

[13] In our view, growth of employment (measured by the number of workers in a region) is not a good indicator reflecting economic development, as regional differences in the type of labour might spur comparison. Suitable variables would either be the growth of employment in full-time equivalents, or the "volume" of labour, measures in hours. Both variables are not available at this level.

5 Disparities and economic convergence

5.1. THE ECONOMIC DIMENSION

From the economic point of view, there is no "general recipe" for regional success in economic growth. As UNECE (2000) puts it: "*The absence of a clear link between theoretical models and economic policy guidelines as regards the determinants of economic growth is probably one reason for contradictory interpretations of the empirical facts on long-term economic performance.*" (p. 156)

The conceptual roots of the concept of convergence lie in the neoclassical growth model by Solow. In this model, output is produced jointly by labour and fixed capital, the latter of which exhibits decreasing marginal productivity. Exogenous factor such as the growth of the labour force and the rate of technical progress may shift the output-curve, but do not "endogenously" accelerate the growth process. In this framework, an economy will converge in a long-term growth path to its "steady state" equilibrium, in which it will only further grow by the rate of growth of its labour population and the exogenous rate of technical progress. In the short run, economies below their steady state might grow faster by improving their capital/labour ratio (as marginal productivity of capital is still higher). From this concept follows, that poorer regions (which are generally considered to have lower capital/labour ratios should grow at a higher rate than richer regions (which should already be closer to their steady-state growth level) – this is the so called "convergence hypothesis". As a confinement, one has to mention, that the same steady state is reached under the assumption of similar tastes/cultures and technologies of the regions in question – this is generally referred to as "absolute convergence", whereas if economies are allowed to differ in these parameters, implying different steady-states, one speaks of "conditional convergence".

Empirical investigation of the convergence hypothesis was and still is a widely accomplished exercise in economic growth research in the last decades, most of the more recent works referring to the (seminal) textbook of Barro, Sala-i-Martin (1995) on economic growth. The two concepts of convergence, β-convergence and σ-convergence, are going to be empirically addressed for the regions of consideration in this paper.

The first concept of β-convergence applies when a poor economy tends to grow faster than a rich one so that it catches-up with the rich one in terms of per capita product. In the most simple empirical specification, this hypothesis can be assessed by regressing the (average) growth of per capita product on the initial level of GDP. A (significant) negative sign of the parameter β supports the hypotheses of poorer economies growing faster and thus converging (and catching-up) to the richer regions in terms of the level of GDP p.c.[14]. A longer time span implies a lower parameter β. The empirical assessment of the hypothesis on β-convergence is performed in the present paper not only over the full sample of regions, but also for the clusters (identified in the first cluster analysis of economic structure) – and henceforth conditioning the convergence hypotheses to more similar subsets of regions.

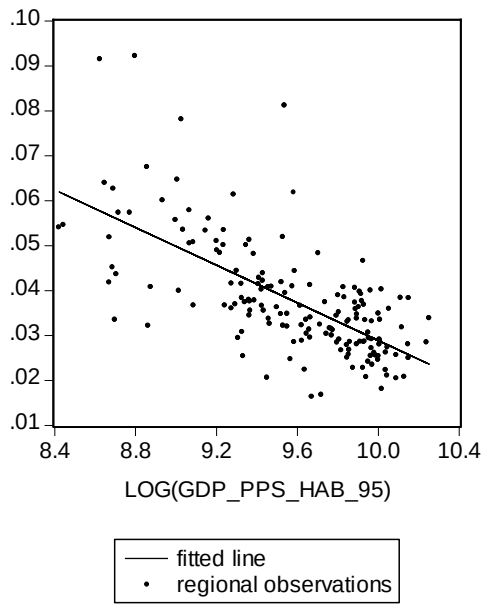
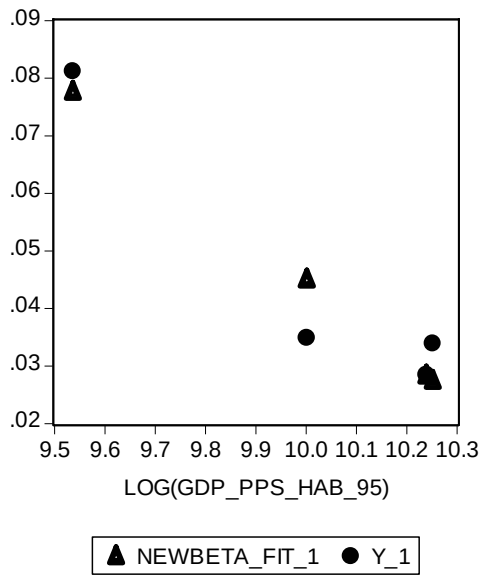
[14] In the paper at hand, the following empirical model is estimated:

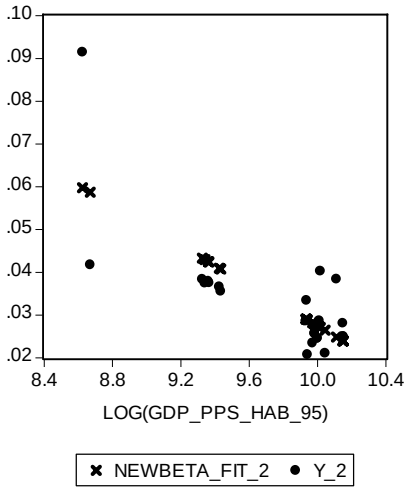
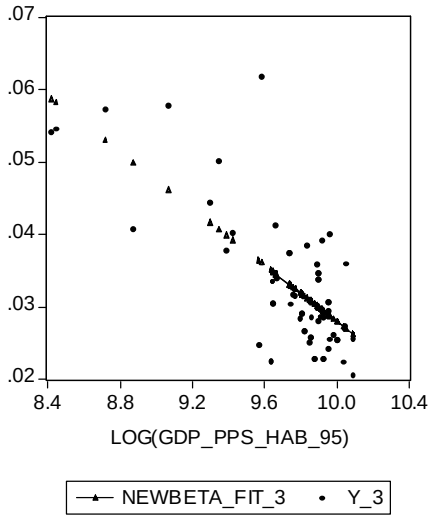
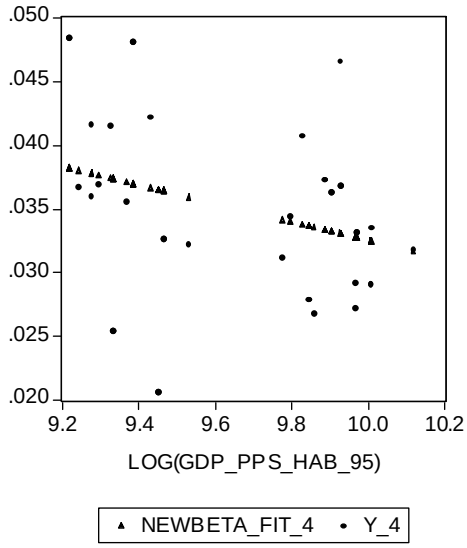
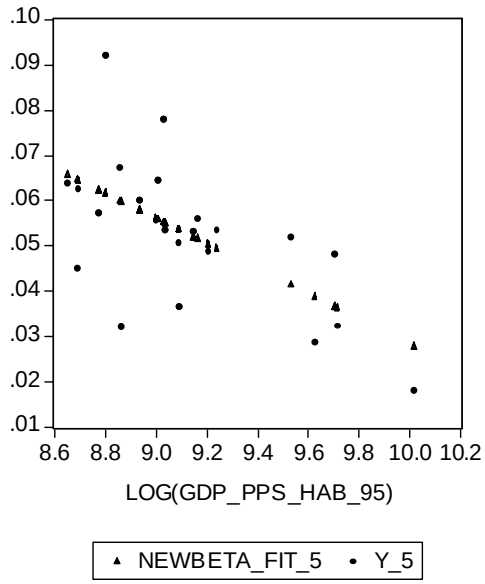
$$\frac{1}{T}\log\left(\frac{GDP_{p.c.03}}{GDP_{p.c.95}}\right) = \alpha + \beta * \log\left(GDP_{p.c.95}\right) + u_i$$

According to the second concept - σ-convergence, convergence occurs because of dispersion declining. Dispersion might be measured for example in terms of the standard deviation of per capita GDP. β-convergence generally tends to generate σ-convergence, but this might be offset by new disturbances increasing dispersion (e.g. changing terms of trade).

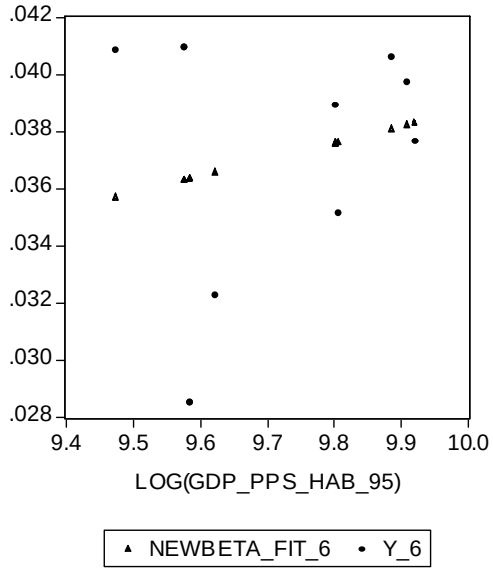
5.2. EMPIRICAL ASSESSMENT

Estimating the model of unconditional β-convergence over the whole sample of regions yields the following result: $\frac{1}{8}\log\left(\frac{GDP_{p.c.03}}{GDP_{p.c.95}}\right) = .238\text{-}0.0209 * \log\left(GDP_{p.c.95}\right) + u_i$, with significant coefficients, and an R^2 of 0.455. Hence, in general, there is evidence for convergence over the whole sample of regions in regard. In all but two (cluster nr. 6 and 8) estimations over the different clusters yielded significant negative estimates for the parameter beta, indicating convergence in the clusters. Still, one has to remark that because of the low number of observations in some clusters, results are not meaningful, so the interpretation will be restricted to clusters only with meaningful results.

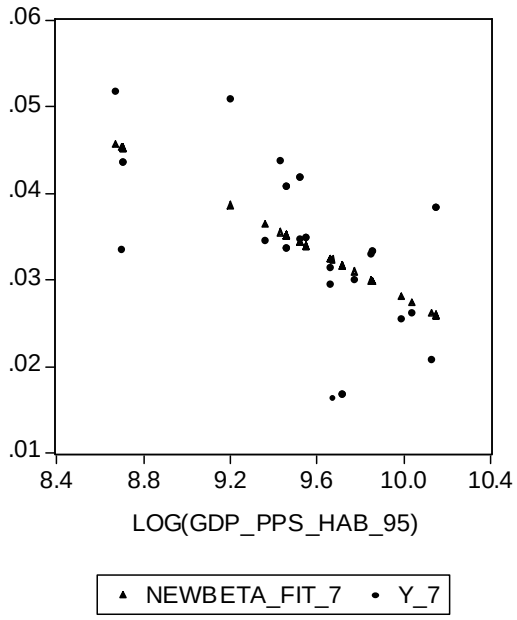
All regions	**Metropoles**
	

Agglomerations	Regional centers, industrial type
	
Regional centers, tertiary type	**Highly industrialized regions**
	

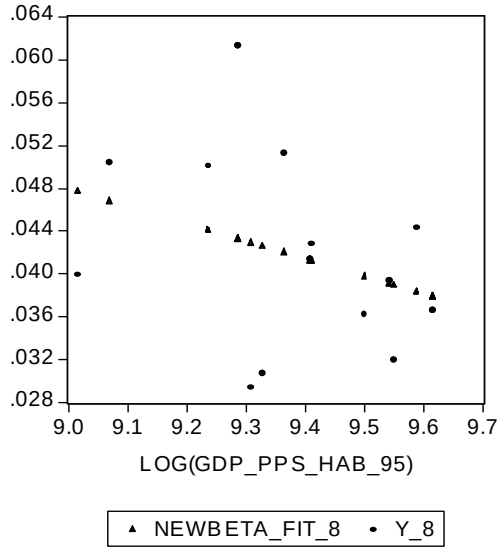
Touristic regions



Rural regions – tertiary type



Rural regions, secondary type



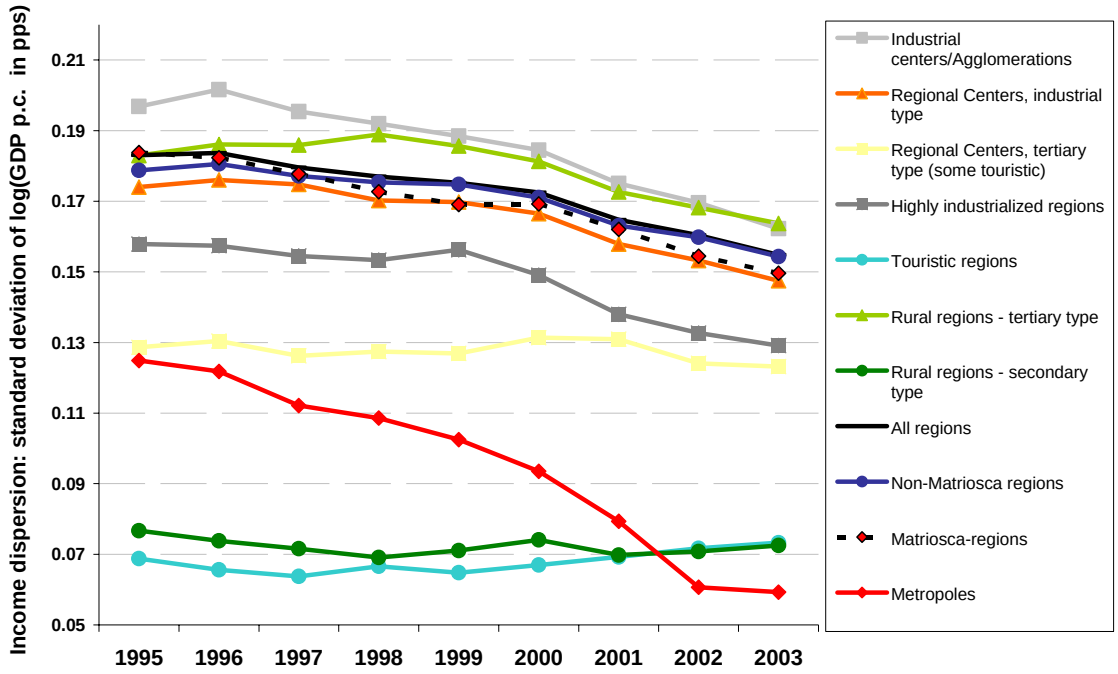
- A further regression over the whole sample (in the above specification) including a dummy variable for all Matriosca regions yields a significant "Matriosca effect" as far as growth of GDP p.c. is concerned, and a lower coefficient of convergence. This is equivalent to saying that the Matriosca regions were drivers of convergence between the regions of the four national states.

- The highest estimated beta is found for the cluster of the metropoles, according to the high growth of GDP p.c in Budapest. The low number of observations (4 objects) on the other hand addresses the meaningfulness of this result.
- The highest speed of convergence (highest beta) is found in the highly industrialized regions, mainly resulting from the strong appearance of regions in transition in this cluster. This finding is also supported by the results of cluster analysis 2, where most of these regions were located in the "catching-up" cluster.
- Convergence is lowest in the regions of the "tertiary type" (regional centers and rural areas), although for group 4, the regional centers of the tertiary type, the estimated model has a far lower explanatory power (pointing to the heterogeneity of regions assembled in this cluster).

Figure 13: Results for the estimation on β-convergence over the cluster groups from cluster analysis 1

	constant	Std.error	Prob.	beta-coeff.	Std.error	Prob.	R^2	Obs
Metropoles	0.75	0.15	0.04	-0.07	0.02	0.04	0.91	4
Industrial centers/Agglomerations	0.26	0.05	0.00	-0.02	0.00	0.00	0.54	21
Regional Centers and densely populated areas (urban hinterland) of the industrial type	0.22	0.02	0.00	-0.02	0.00	0.00	0.57	48
Regional Centers and denseley populated areas (urban hinterland) tertiary type (some touristic)	0.10	0.04	0.02	-0.01	0.00	0.10	0.10	28
Highly industrialized regions	0.30	0.07	0.00	-0.03	0.01	0.00	0.39	23
Touristic regions	-0.02	0.09	0.84	0.01	0.01	0.56	0.05	9
Rural regions - tertiary type	0.16	0.04	0.00	-0.01	0.00	0.00	0.36	22
Rural regions - secondary type	0.20	0.13	0.15	-0.02	0.01	0.25	0.11	14
All regions	0.24	0.02	0.00	-0.02	0.00	0.00	0.46	169

Figure 14: Results for the calculation on σ-convergence over the cluster groups from cluster analysis 1[15]



[15] In all these calculations Croatia had to be excluded for reasons of data availability.

Income dispersion, measured as the standard deviation of GDP p.c in pps has declined in almost all of the (structural) clusters. Exemptions are the (Austrian) touristic regions and the rural regions of the secondary type. Though, in both of these clusters dispersion of per capita income was already lowest at the beginning of the period. In all of the other clusters, decline of income-dispersion started (at latest) in the year 2001.

The highest decline of dispersion of all is found in the metropolitan cluster, which (starting from the middle), shows the lowest dispersion of per capita income of all clusters from the year 2002 onwards. The second highest decline of dispersion is found in the cluster of the (industrial) agglomerations.

As Matriosca is comprised of a variety of region types with regions from four national states, the dispersion of per capita income is higher than in most of the clusters of regard. Nontheless, compared to the rest of the regions in the sample (the "Non-Matriosca" regions), the dispersion of per capita income in the Matriosca region is from 1998 onwards always slightly below the dispersion of per capita income of the non-Matriosca regions.

6 Literature

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7 Annex

7.1. RESULT FOR CLUSTER ON ECONOMIC STRUCTURE AND GEOGRAPHICAL ISSUES

Figure 15: Descriptive statistics for the clusters identified in cluster analysis 1

		Metropoles	Agglomerations	Regional Centers of the industrial type	Regional Centers tertiary type (some touristic)	Highly industrialized regions	Touristic regions	Rural regions - tertiary type	Rural regions - secondary type	Total
Population density	Mean	2180	415	182	233	86	33	64	64	216
	Std. Deviation	1335	520	98	200	29	12	16	23	438
	Minimum	695	102	85	96	35	21	37	10	10
	Maximum	3837	2631	636	1132	173	58	104	101	3837
GDP in PPS per capita 03	Mean	29176	22961	22127	21335	14033	22972	17294	12937	19337
	Std. Deviation	7637	7430	6064	5965	4949	4044	7505	4949	7311
	Minimum	17904	8133	7003	13836	7246	18022	6951	5743	5743
	Maximum	37158	33464	30961	31950	25908	27619	34792	20779	37158
GDP in PPS per capita 95	Mean	23050	17844	17650	16125	9834	17027	14758	11930	15576
	Std. Deviation	6775	6458	4723	4735	4219	2794	5817	2088	5657
	Minimum	13851	5564	4544	10076	5699	12994	5833	8219	4544
	Maximum	28328	25586	24077	24773	22413	20320	25599	14971	28328
Inhabitants	Mean	2315	1087	339	426	257	100	274	163	432
	Std. Deviation	1354	582	124	214	147	67	132	71	507
	Minimum	780	531	119	105	46	21	90	38	21
	Maximum	3749	3081	618	873	564	232	543	329	3749
Share of empl. in primary sector	Mean	1	4	6	8	10	20	8	29	9
	Std. Deviation	0	3	3	5	5	6	4	5	8

		Metropoles	Agglomerations	Regional Centers of the industrial type	Regional Centers tertiary type (some touristic)	Highly industrialized regions	Touristic regions	Rural regions - tertiary type	Rural regions - secondary type	Total
	Minimum	0	0	0	1	2	12	1	21	0
	Maximum	1	10	16	18	18	27	15	38	38
Share of empl. in secondary sector	Mean	20	33	33	22	40	24	27	25	30
	Std. Deviation	8	10	7	6	5	4	6	5	9
	Minimum	14	15	20	12	30	18	17	16	12
	Maximum	30	48	50	35	52	31	44	36	52
Share of empl. in tertiary sector	Mean	79	63	61	70	50	56	65	46	61
	Std. Deviation	7	9	6	6	6	5	6	6	10
	Minimum	70	49	49	61	37	49	52	38	37
	Maximum	85	81	77	82	59	64	75	57	85
Share of value added in primary sector	Mean	0	2	4	4	5	3	5	11	5
	Std. Deviation	0	1	3	3	3	2	3	7	4
	Minimum	0	0	0	0	2	1	0	4	0
	Maximum	1	5	14	13	13	6	9	26	26
Share of value added in secondary sector	Mean	22	31	32	21	44	33	24	35	31
	Std. Deviation	7	9	5	6	6	6	5	7	9
	Minimum	14	13	22	12	33	21	15	25	12
	Maximum	30	42	45	31	54	41	38	46	54
Share of value added in tertiary sector	Mean	78	67	64	75	52	64	71	55	65
	Std. Deviation	6	8	6	5	5	6	5	6	10
	Minimum	70	56	45	67	43	58	61	43	43
	Maximum	85	85	76	84	61	78	80	69	85

Source: Authors' calculations, based on Eurostat data

Maximum value of all clusters

Minimum value of all clusters

Figure 16: Descriptive statistics for the clusters identified in cluster analysis 2

Variables		Hungarian outliers	Faster catching-up regions	Slowly catching-up or falling behind regions	Initial leaders, faster moving ahead	Initial leaders, slower moving ahead	Demographic outliers	Total
Economically active population (in 1000) 2003	Mean	397	115	160	270	184	134	196
	Std. Deviation	294	61	160	341	91	75	227
	Minimum	142	18	10	16	58	69	10
	Maximum	777	240	1085	1728	386	216	1728
Economically active population (in 1000) 1999	Mean	390	113	159	263	169	107	190
	Std. Deviation	303	60	158	333	85	63	222
	Minimum	132	17	10	15	55	53	10
	Maximum	799	249	1073	1678	362	176	1678
GDP p.c. in pps, 2003	Mean	16868	14057	16140	27105	25837	18279	20655
	Std. Deviation	6641	4718	3476	3557	2105	3485	6586
	Minimum	11568	7003	7831	21414	22257	14906	7003
	Maximum	26526	24110	25368	37158	29588	21866	37158
GDP p.c. in pps, 1995	Mean	8588	9043	12062	20963	20797	13696	15576
	Std. Deviation	3688	3183	2820	2673	2122	3617	5657
	Minimum	5564	4544	5822	16519	16931	9520	4544
	Maximum	13851	16377	18641	28328	25048	15848	28328
Growth of economically active population 99-03	Mean	4	2	1	3	9	27	3
	Std. Deviation	5	3	5	3	2	4	6
	Minimum	-3	-3	-22	-4	5	23	-22
	Maximum	9	7	15	9	13	30	30
Growth of GDP p.c. in pps, 95-03	Mean	99	56	35	29	25	37	36
	Std. Deviation	11	8	8	6	6	21	15
	Minimum	87	43	14	20	16	14	14
	Maximum	109	72	54	45	35	57	109
Growth of Inhabitants	Mean	2	-1	0	3	3	1	1

Variables		Hungarian outliers	Faster catching-up regions	Slowly catching-up or falling behind regions	Initial leaders, faster moving ahead	Initial leaders, slower moving ahead	Demographic outliers	Total
	Std. Deviation	10	3	3	3	3	0	4
	Minimum	-11	-11	-6	-5	-2	1	-11
	Maximum	14	2	14	12	10	1	14
Growth of value added in the secondary sector	Mean	328	155	42	28	26	11	53
	Std. Deviation	106	91	39	11	14	11	71
	Minimum	198	34	-8	7	-5	3	-8
	Maximum	453	284	177	67	57	19	453
Growth of value added in the tertiary sector	Mean	290	158	60	44	49	49	68
	Std. Deviation	92	95	51	10	6	28	66
	Minimum	235	25	14	23	39	30	14
	Maximum	428	249	211	63	59	69	428
Inhabitants (in 1000) 2003	Mean	896	270	422	596	399	308	459
	Std. Deviation	648	153	458	754	200	174	529
	Minimum	316	38	21	32	122	139	21
	Maximum	1712	585	3081	3749	844	486	3749
Inhabitants (in 1000) 1995	Mean	909	272	422	584	384	306	455
	Std. Deviation	733	151	454	750	186	173	527
	Minimum	312	39	22	31	117	137	22
	Maximum	1918	573	3054	3749	794	484	3749

Source: Authors' calculations, based on Eurostat data

Maximum value of all clusters

Minimum value of all clusters

Figure 17: Descriptive statistics for the clusters identified in cluster analysis 3

	Cluster number	1	2	3	4	5	6
GDP p.c. in pps 1995	Mean	6.881	8.957	12.443	11.327	19.697	20.804
	Std. Dev.	2.223	1.244	2.520	1.138	1.786	3.316
	Maximum	13.851	10.771	16.519	12.879	23.058	28.328
	Minimum	4.544	5.988	5.822	8.672	15.306	13.649
GDP p.c. in pps 2003	Mean	11.977	13.394	16.828	15.785	24.925	26.699
	Std. Dev.	4.689	2.376	3.557	1.194	2.667	4.081
	Maximum	26.526	17.601	24.110	17.484	29.690	37.158
	Minimum	7.003	7.831	8.133	12.990	18.067	19.086
Growth of GDP p.c. in pps 95-03	Mean	72	49	35	40	27	29
	Std. Dev.	19	9	9	6	7	6
	Maximum	109	63	64	50	45	40
	Minimum	51	31	18	30	14	18
Growth of total employment 95-03	Mean	0,08	-0,04	0,04	0,14	0,06	0,12
	Std. Dev.	0,06	0,02	0,03	0,03	0,02	0,03
	Maximum	0,19	0,00	0,11	0,19	0,10	0,19
	Minimum	-0,06	-0,08	-0,05	0,10	0,01	0,05
Number of regions in cluster	Number	14	15	43	12	34	51

Source: Authors' calculations, based on Eurostat data

Maximum value of all clusters

Minimum value of all clusters

7.2. RESULT FOR THE MATRIOSCA REGION IN BOTH CLUSTER ANALYSIS

Code	Region	Type, Cluster 1	Type, Cluster 2	Type, Cluster 3
AT211	Klagenfurt-Villach	Regional Centers and denseley populated areas (urban hinterland) tertiary type (some touristic)	Initial leaders, faster moving ahead	Lower growth of GDP p.c. and employment
at212	Oberkärnten	Touristic regions	Slowly catching-up or falling behind regions	Low growth of GDP p.c. and employment
at213	Unterkärnten	Rural regions - secondary type	Faster Catching-up regions	Low growth of GDP p.c. and employment
at221	Graz	Regional Centers and densely populated areas (urban hinterland) of the industrial type	Initial leaders, faster moving ahead	Higher growth of GDP p.c. and high growth of employment
at222	Liezen	Touristic regions	Slowly catching-up or falling behind regions	Low growth of GDP p.c. and employment
at223	Östliche Obersteiermark	Highly industrialized regions	Faster Catching-up regions	Low growth of GDP p.c. and employment
at224	Oststeiermark	Rural regions - secondary type	Slowly catching-up or falling behind regions	Low growth of GDP p.c. and employment
at225	West- und Südsteiermark	Rural regions - secondary type	Slowly catching-up or falling behind regions	Low growth of GDP p.c. and employment
at226	Westliche Obersteiermark	Rural regions - secondary type	Slowly catching-up or falling behind regions	Low growth of GDP p.c. and employment
at111	Mittelburgenland	Rural regions - secondary type	Faster Catching-up regions	Medium growth of GDP p.c., decline in employment
at112	Nordburgenland	Rural regions - secondary type	Slowly catching-up or falling behind regions	Low growth of GDP p.c. and employment
at113	Südburgenland	Rural regions - secondary type	Faster Catching-up regions	Medium growth of GDP p.c., decline in employment
HU221	Gyor-Moson-Sopron	Highly industrialized regions	Hungarian outliers	High growth of GDP p.c. and employment
HU222	Vas	Highly industrialized regions	Faster Catching-up regions	High growth of GDP p.c. and employment
HU223	Zala	Highly industrialized regions	Faster Catching-up regions	High growth of GDP p.c. and employment
HU231	Baranya	Rural regions - tertiary type	Faster Catching-up regions	High growth of GDP p.c. and employment
HU232	Somogy	Rural regions - tertiary type	Faster Catching-up regions	High growth of GDP p.c. and employment
HU233	Tolna	Highly industrialized regions	Slowly catching-up or falling behind regions	
HR031	Istarska zupanija	Rural regions - secondary type		
HR014	Koprivnicko-krizevacka zupanija	Rural regions - secondary type		
HR013	Medimurska zupanija	Regional Centers and densely populated areas (urban hinterland) of the industrial type		
HR012	Varazdinska zupanija	Regional Centers and densely populated areas (urban hinterland) of the industrial type		
si001	Pomurska	Rural regions - secondary type	Slowly catching-up or falling behind regions	Medium growth of GDP p.c., decline in employment
si002	Podravska	Regional Centers and densely populated areas (urban hinterland) of the industrial type	Faster Catching-up regions	Medium growth of GDP p.c., decline in employment
si003	Koroska	Highly industrialized regions	Slowly catching-up or falling behind regions	Medium growth of GDP p.c., decline in employment
si004	Savinjska	Highly industrialized regions	Faster Catching-up regions	Medium growth of GDP p.c., decline in employment
si005	Zasavska	Highly industrialized regions	Slowly catching-up or falling behind regions	Medium growth of GDP p.c., decline in employment
si006	Spodnjeposavska	Highly industrialized regions	Slowly catching-up or falling behind regions	Medium growth of GDP p.c., decline in employment
si009	Gorenjska	Highly industrialized regions	Faster Catching-up regions	Medium growth of GDP p.c., decline in employment

si00a	Notranjsko-kraska	Highly industrialized regions	Faster Catching-up regions	Medium growth of GDP p.c., decline in employment
si00b	Goriska	Highly industrialized regions	Faster Catching-up regions	Medium growth of GDP p.c., decline in employment
si00c	Obalno-kraska	Regional Centers and denseley populated areas (urban hinterland) tertiary type (some touristic)	Faster Catching-up regions	Low growth of GDP p.c. and employment
si00d	Jugovzhodna Slovenija	Highly industrialized regions	Demographic outliers	Medium growth of GDP p.c., decline in employment
si00e	Osrednjeslovenska	Regional Centers and densely populated areas (urban hinterland) of the industrial type	Faster Catching-up regions	Low growth of GDP p.c. and employment
ITD31	Verona	Industrial centers/Agglomerations	Initial leaders, slower moving ahead	Higher growth of GDP p.c. and high growth of employment
ITD32	Vicenza	Industrial centers/Agglomerations	Initial leaders, slower moving ahead	Higher growth of GDP p.c. and high growth of employment
ITD33	Belluno	Rural regions - tertiary type	Initial leaders, slower moving ahead	Lower growth of GDP p.c. and employment
ITD34	Treviso	Industrial centers/Agglomerations	Initial leaders, slower moving ahead	Higher growth of GDP p.c. and high growth of employment
ITD35	Venezia	Regional Centers and denseley populated areas (urban hinterland) tertiary type (some touristic)	Initial leaders, faster moving ahead	Lower growth of GDP p.c. and employment
ITD36	Padova	Industrial centers/Agglomerations	Initial leaders, faster moving ahead	Higher growth of GDP p.c. and high growth of employment
ITD37	Rovigo	Regional Centers and densely populated areas (urban hinterland) of the industrial type	Initial leaders, faster moving ahead	Lower growth of GDP p.c. and employment
ITD41	Pordenone	Regional Centers and densely populated areas (urban hinterland) of the industrial type	Initial leaders, slower moving ahead	Higher growth of GDP p.c. and high growth of employment
ITD42	Udine	Regional Centers and densely populated areas (urban hinterland) of the industrial type	Initial leaders, faster moving ahead	Lower growth of GDP p.c. and employment
ITD43	Gorizia	Regional Centers and densely populated areas (urban hinterland) of the industrial type	Initial leaders, faster moving ahead	Lower growth of GDP p.c. and employment
ITD44	Trieste	Regional Centers and denseley populated areas (urban hinterland) tertiary type (some touristic)	Initial leaders, faster moving ahead	Lower growth of GDP p.c. and employment