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## Spatial clustering in low density circumstances: Industrial specialisation by region in two Nordic countries

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**38<sup>th</sup> Congress of The European Regional Science Association**  
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**SPATIAL CLUSTERING IN LOW DENSITY  
CIRCUMSTANCES: INDUSTRIAL SPECIALISATION BY  
REGION IN TWO NORDIC COUNTRIES**

**ABSTRACT:** Specialisation is considered to be an important competitive strategy not only in individual firms, but also at the regional level. The spatial clustering of similar or related industrial activities is increasingly argued to derive from inter-firm interaction which contributes to the creation of new knowledge and other unique resources embedded in certain places, regions and countries.

Spatial conditions for knowledge creation, and consequently, for upgrading competitiveness through inter-firm learning vary considerably. The present paper focuses on Finland and Sweden, which are characterised by low population densities and scattered settlement structures. In these countries, most functional regions can be considered to be too small to accommodate a specialised industrial cluster benefiting from economies of scale and scope. On the other hand, many regions with a sufficient volume of economic activities tend to be too large in area to create a seedbed for specialised growth relying on inter-firm interaction on a daily basis.

The issues outlined above are investigated on the basis of a large data set covering manufacturing industries disaggregated by region and by sector from the 1970s to the 1990s. The two countries are compared and the specialisation of regions analysed using various regional classifications. According to the findings, the industrial structures of the Finnish labour market districts and Swedish municipalities do not seem to display any clear-cut trend towards regional specialisation from the 1970s to the 1990s. However, a trend towards increased regional specialisation was found in Finland in the early 1990s. According to the observations, regional

specialisation is not connected with above-average regional performance in terms of value added or employment.

## **1. Introduction**

The specialisation of local and regional economies and the spatial clustering of economic activities have in recent years received increasing attention in economic and geographical research as well as in industrial and regional policies. Reasons for this interest derive from various sources. Firstly, there are empirical observations on successful spatial concentrations of industrial activities, and they are not limited to high-tech concentrations. Secondly, the process of deepening integration in Europe has led to expectations of a more specialised regional division of labour concerning industrial dynamics. Thirdly, theoretical developments on endogenous growth processes centre around issues such as knowledge-creation and learning, innovation dynamics and functional environment, which are characteristically spatial factors.

Although specialisation and clustering/agglomeration are usually regarded as essential ingredients of regional economic growth, there is also another side to the coin. In numerous cases, from Ruhrgebiet to Detroit, a specialised region has been bound to a declining sector or outdated business practices. Thus, the differentiation of "bad agglomerations" (see Hassink 1997) from good ones is a key research task in the analysis of spatial clustering and is also highly relevant to policy. In practice, even many successful, specialised regions have experienced periods of crisis and decline, but have somehow been able to unlearn their outdated concept of success and adapt to new competitive conditions.

Basically, there are two approaches to the empirical analysis of regional specialisation and spatial clustering phenomena. The development processes of individual industries or regions can be investigated by means of case studies, and extensive surveys can be utilised to determine the role and trends of these phenomena in industrial structures and regional economies. This paper utilises the latter approach. It seeks to discover, using detailed statistical data on manufacturing industries, whether any trends towards increased specialisation of regional economies have been visible in Finland and Sweden in the recent past. The case for an analysis of these countries can be argued on the grounds that some of the prevalent spacio-structural characteristics typical to them, such as a scattered settlement patterns and small centres, might be an obstacle to local and regional specialisation as a competitive strategy. In addition, the obvious spacio-economic

similarities between these countries increase the relevance of the comparative setting.

Section 2 discusses some aspects of the dynamics of regional specialisation and their relation to the Nordic scene. The methods and data are introduced in Section 3, and Section 4 includes empirical observations. Section 5 draws some conclusions.

## **2. Regional specialisation and localisation**

### **2.1 Research traditions: a look at various aspects**

The analysis of localisation, that is, the spatial concentration of certain industrial activities, can either focus on industrial sectors and regional economies or on individual firms. The former approach elaborates factors which contribute to localisation; these can be general or typical to a certain industry or region. In the latter case, the analysis centres on the influences of a firm's location on its competitiveness.

The localisation of an industry as such is an age-old indisputable empirical phenomenon. Nor is it a recent research topic: in 1920 Alfred Marshall formulated a fairly detailed analysis of the economic mechanisms facilitating it. In fact, the recent contribution by Krugman (1991) to this issue is basically only a technical refinement of the Marshallian account: the role of labour markets, specialised services, and technological spillovers in the process of localisation are specified in terms of a formalised economic model.

Notwithstanding the above-mentioned foundation of the theory of localisation, no single theoretical frame of reference prevails in the analysis of the phenomenon. Rather, a multitude of diverse conceptual and theoretical frameworks and explanations are employed. Figure 1 gives an overview.

Horizontally, the main distinction is between regional concentration (agglomeration) in general and the localisation of particular industries. In this vein, external economies facilitating concentration can be divided into two groups: 1) economies related to the size of a regional or local economy (infrastructure capacities, demand of local markets, etc.), and, 2) economies

related to a particular industrial activity (provision of specific education, specialised services, etc.) (see de Vet 1993). Vertically, the distinction in Figure 1 is based on the nature of interpretations concerning the driving forces of agglomeration and localisation; some of them focus on static explanations, others dwell on dynamics.

**Figure 1.** Research approaches in the analysis of regional concentration and localisation of economic and industrial activities (According to Malmberg *et al.* 1996).

	<b>Agglomeration of economic activity in general</b>	<b>Spatial clustering of related firms and industries</b>
<b>Static perspective</b> Transaction efficiency and flexibility	Manufacturing belts Metropolises	Regional production systems Industrial districts
<b>Dynamic perspective</b> Knowledge accumulation	Creative regions Entrepreneurial regions	Learning regions Innovative milieux Industry clusters

Traditionally, the case for agglomeration and localisation has usually been put forward on the static grounds. The regional concentration of economic activities is said to lead to increased efficiency as a result of decreased transport and transaction costs; in some cases, these benefits are available to any industry, but they might also be industry-specific. In more recent theoretical accounts, the emphasis has turned towards more dynamic explanations, some of which are referred to in the lower right-hand corner of Fig. 1.

## 2.2 Dynamics of localisation

The localisation of industries, and the qualities of local environments as its driving forces, might appear to be an obsolete research topic in current circumstances, which are characterised by the internationalisation of firms, abolition of tariff and technical barriers to trade, and improvements in transport and communication networks. However, quite the opposite can be argued: as the above-mentioned changes tend to intensify competition between location sites, distinctive localised capabilities in a broader sense, referring to a specific institutional endowment, built structures, natural resources, and especially knowledge and skills, tend to grow in importance.

Thus, globalization and localisation can be viewed as tightly intertwined processes.

Following the above argumentation, the dynamic explanation for the tendency towards industrial localisation can be formulated in the following way (see Maskell *et al.* 1998). The intensification and internationalisation of industrial competition along with improvements in transport and communication links has implications for the value of various competitive resources. An increasing share of these resources is accessible to all potential competitors. This process of ubiquitification (op. cit., 29-49) has already resulted in major changes in the international division of labour when, for instance, labour-intensive activities have been transferred to low-cost locations. For purposes of coping with the mounting competitive pressure, firms in high-cost countries have been compelled to rely on various non-price strategies for competitiveness, such as technological and organisational innovations, product differentiation, and concentration on narrow niches of competence and related cooperative and networking practices. These pursuits, especially the drive for high-tech, have also been supported by public policies. Numerous policy-makers have tried to simulate success stories in regional development by means of technology centres, science parks and so on.

In general, the ability to create and utilise new knowledge is the main means of maintaining and upgrading competitiveness in terms of non-price strategies. It presupposes an interactive process which is conditioned by a specific constellation of economic actors in a certain geographical and functional environment. Given the fact that a major share of codified knowledge cannot be anchored to a specific context, but diffuses rapidly into use anywhere, the value of industry- and firm-specific tacit knowledge tends to grow in importance as a decisively important competitive factor. There are barriers to the diffusion of this kind of knowledge; it is embedded in organisations and the people working in them, and is essentially non-codifiable and non-transferable. As a result, the evolution of competitive economic activities is characterised by path-dependency, and by relatively stable patterns of regional and national industrial specialisation.

Basically, the increased significance of a local environment derives from the tendency that location decisions of firms are not dependent on a locational site per se, but on the possibility of utilising and participating in the development of specific regional capabilities, and, in the final analysis, thus benefiting from institutional, socio-economic and cultural differences between

regions. A favourable operational environment eliminates the uncertainty faced by economic actors and contributes to a learning process which is based on inter-organisational and inter-personal links at the local level, thus collectively benefiting the actors involved in technological and organisational learning processes (cf. Malmberg *et al.* op.cit.). This kind of localisation process is not only specific to high-tech industries, but, in fact, one could argue that technology as such is not the main driving force, even in the case of Silicon Valley itself.

### 2.3 A Nordic dilemma

The rationale argued above for increased industrial localisation is primarily linked with the dynamics of functional regions such as daily urban areas. Assuming that an interactive learning process is supported by face-to-face contacts, geographical proximity matters: the upgrading of competitiveness proceeds most successfully among those economic actors which can informally exchange ideas. Clearly, this leads to the issue of the implications of enhancing localisation for the development of different functional economic regions.

This issue is of particular interest in the Nordic countries, and has been an important impetus to the study, which includes the present survey. The spatial structure of these countries, especially Finland, Sweden and Norway, deviates to a major degree from the conditions prevailing in most other western European countries. Most daily urban regions are small and scattered far from each other. This can be argued to influence the possibilities for industrial localisation and the specialisation of local economies. On one hand, most labour market districts and daily urban regions are too small to accommodate a specialised industry with several firms. On the other hand, many of these functional regions are geographically separate from each other in the that their resources cannot be enhanced by linking them to larger functional regions by means of new infrastructure networks. Provided that industrial localisation and regional specialisation are important competitive factors, which require a certain critical mass, the Nordic spatial structure can be argued to form a structural constraint to upgrading national competitiveness and that the prospects of maintaining the prevailing structure are under threat.

### 3. Data, methods and study periods

It goes without saying that the analysis of different research issues implied by localisation and specialisation phenomena require different approaches in terms of methods and data. In this case, extensive statistical data on approximately comparable periods are utilised to clarify the prevalence and trends of regional specialisation. The resulting findings can be employed as a starting point in more detailed industry-specific and region-specific analyses of localisation, including the identification of good and bad clusters and agglomerations.

### 3.1 Data

Of the three data sets, two concern Finland and one Sweden. The observations on employment by manufacturing industry and region in Finland in the years 1974-1993 are based on unpublished industrial statistics (ISIC, 4-digit classification, 80 sectors). Labour market districts (LMD), formed by combining local administrative units (municipalities) according to commuter rates, are used as the basis for regional division (N=197). Thus, this regional division corresponds, at least in principle, to the concept of a functional region, where economic actors can benefit from inter-firm interaction and joint localised capabilities. In addition to the years 1974 and 1993, the detailed data cover the intermediate years 1980, 1985 and 1990.

The Swedish data set covers the years 1970 and 1990, and it is almost completely comparable with the Finnish data in terms of the industrial classification in use<sup>1</sup>. The regional division is based on municipalities (N=270), and corresponds to daily regions in most cases.

The third data set concerns value added (manufacturing industries, 15 sectors, 1990 fixed prices) in the Finnish regions in the years 1988-1995.<sup>2</sup> Two regional divisions are used: the NUTS 4 (subregion, N = 85) and NUTS 3 (region, N = 20). Although both these divisions are used in regional policies, they are not based on any systematic analysis of functionality, for instance, in terms of commuting. On the other hand, these delineations do not include as many very small units as the LMD data on the years 1974-1993.

### 3.2 Specialisation indices

The specialisation of local and regional economies is described here by means of the following three indices: Gini coefficient (Krugman 1991, Malmberg 1995), Theil entropy measure (Theil



1984) and Isard specialisation index (Isard 1960).<sup>3</sup>

All these three indices describe the specialisation, or from the opposite perspective, diversification, of a local or regional economy by comparing its sectoral structure to the national one. Given the fact that the indices utilise the same information and a fairly similar procedure, their values are quite similar. In this case, the correlations between the values of the Gini and Isard measures are 0.95-0.97, and the respective correlations with the Theil measure range between 0.81-0.95.

### 3.3 Period and Context

The use of the industrial structure of the national economy as the given point of comparison in each specialisation index results in important qualifications to the interpretation of the empirical findings. In both countries investigated here, industrial structures have obviously undergone some major changes, which have undoubtedly been reflected in the patterns of industrial location. Table 1 summarises some background information.

**Table 1.** Figures on manufacturing industries in Finland in 1974, 1985 and 1993, and in Sweden in 1970 and 1990 (source: published and unpublished material on industrial statistics).

<b>FIN</b>	<b>1974</b>	<b>1985</b>	<b>1993</b>
<b>Employment</b>	526 518	499 143	342 843
<b>Number of plants</b>	6273	7309	5839
<b>Average size of</b>	83,9	68,3	58,7
<b>Gini coefficient (R)</b>	0,426	0,409	0,408
<b>Gini coefficient (I80)</b>	0,309	0,304	0,308
<b>Gini coefficient (I9)</b>	0,193	0,200	0,217
<b>SWE</b>	<b>1970</b>	<b>1990</b>	
<b>Employment</b>	907 725	761 547	
<b>Number of plants</b>	13 576	9 252	
<b>Average size of</b>	66,9	82,3	
<b>Gini coefficient (R)</b>	0,292	0,280	
<b>Gini coefficient (I80)</b>	0,305	0,325	
<b>Gini coefficient (I9)</b>	0,213	0,269	

Even if some "universal" trends, such as a decrease in the amount of manufacturing employment, have proceeded along relatively similar lines in the two countries, there are also some clear-cut differences in the structural development of manufacturing industries in Finland and Sweden. These cannot be explained by the fact that the periods are not exactly the same (1974-1993 v. 1970-1990).

In Finland, manufacturing employment has decreased relatively more than the number of plants, and thus the average size of plants (in employment numbers) has diminished by almost one-third. This is line with the often highlighted increased importance of small and medium sized firms. In contrast, the number of plants has decreased faster than employment in Sweden, and as a consequence their average size has grown.

According to the Gini index, the regional distribution of manufacturing industries is substantially higher in Sweden than in Finland. During the 20-year period, Gini values for both countries have decreased, which implies regional deconcentration. This spatial shift is not at all unexpected, but reflects the tendency of that period in many industrialised countries: rural industrialisation. For present purposes, it is worth emphasising that the spatial dispersal of the manufacturing industry as a whole may well proceed along with a spatial concentration of individual industries and the increasing specialisation of local and regional economies.<sup>4</sup>

In Finland, the degree of sectoral specialisation of the national economy did not change considerably during the study period according to the Gini values (80 sectors). Yet, this does not imply that the industrial structure of the country remained stable. For example, the share of manufacture of wearing apparel decreased by 4.6 percentage points, and the share of the printing and publishing industry increased by 3.0 percentage points. Furthermore, the increased Gini values at the 2-digit level (9 sectors) suggest that the point of comparison in the analysis of regional specialisation was far from constant. In Sweden, the industrial structure seems to have become more specialised according to the Gini values (both 4-digit and 2-digit classifications) from 1970 to 1990. In addition, the employment share of the ten biggest manufacturing sectors increased by 3.6 percentage points.

The second Finnish data set concerns an extremely exceptional period in the development of the national economy, 1988-1995. The depth of the economic crisis of the early 1990s is seen in the fact that GDP rose by only 5.2 percent during the whole seven-year period. Value added in manufacturing industries rose by 22.5 percent, and employment fell by 22.8 percent (see Table 2). During this drastic restructuring process, the Gini index for the location of the manufacturing industry rose from .320 in 1988 to .330 in 1995, which implies a break in the trend in comparison to developments in the period 1974-93. Moreover, the Gini coefficient for the specialisation of industrial structure increased substantially (.152 in 1988, .203 in 1995). The single most important reason for this was the expansion of the electrical and optical equipment sector. Its share grew by at least 11 percent, reaching 19.5 percent in 1995.

**Table 2.** Basic figures on manufacturing industries in Finland in 1988, 1991 and 1995 (source: Statistics Finland: Regional GDP data).

<b>FIN</b>	<b>1988</b>	<b>1991</b>	<b>1995</b>
<b>Employment</b>	507 073	418 709	391 285
<b>Value added (million FIM)</b>	102 350	94 656	125 373
<b>Gini coefficient (R)</b>	0,320	0,322	0,330
<b>Gini coefficient (I)</b>	0,152	0,165	0,203

Evidently, findings on the specialisation of local and regional economies have to be interpreted against the background of the dynamics of the respective national industrial structure. The growth of a certain sector or cluster is only one of the mechanisms through which the structure of a local or regional economy can evolve towards a more specialised pattern.

## 4. Empirical observations

### 4.1. Specialisation from 1970s to 1990s

As the size of a local economy is obviously an important factor in regard to the processes of localisation and specialisation, and also in respect to the interpretation of the findings, the regions under consideration were divided into four groups according to the amount of

manufacturing employment.<sup>5</sup> Changes in the values of the specialisation indices for these groups are presented in Table 3.

**Table 3.** Changes in industrial specialisation in Finland (1974-93) and in Sweden (1970-1990), in regions classified by the amount of manufacturing employment (for the indices: see the Endnote 3).

<b>FIN</b>		<b>Theil</b>		<b>Isard</b>		<b>Gini</b>		<b>T, I, G</b>	
<b>Category</b>	<b>n</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>
<b>Over 5 000</b>	16	11	5	11	5	9	7	7	2
<b>1 000 - 4 999</b>	31	20	11	16	15	19	12	14	9
<b>100 - 999</b>	82	50	32	48	34	51	31	38	23
<b>1 - 99</b>	49	29	20	23	26	27	22	20	18
<b>Total</b>	178	110	68	98	80	106	72	79	52
<b>SWE</b>		<b>Theil</b>		<b>Isard</b>		<b>Gini</b>		<b>T, I, G</b>	
<b>Category</b>	<b>n</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>
<b>Over 5 000</b>	37	14	23	20	17	15	22	12	15
<b>1 000 - 4 999</b>	138	78	60	70	68	72	66	56	48
<b>100 - 999</b>	93	55	38	45	48	49	44	38	33
<b>1 - 99</b>	2	-	2	-	2	-	2	-	2
<b>Total</b>	270	147	123	135	135	136	134	106	98

Of the 131 Finnish regions, which were classified in the same way according to the three indices, 79 achieved a higher index value in 1993 than in 1974 while values decreased in 52 cases. Overall, with the exception of the smallest LMDs, the prevailing trend seems to be slightly in favour of a more specialised industrial structure. However, the changes in index values were, especially in the case of the largest LMDs, quite small.

In Sweden, the three indices give a somewhat different picture than in Finland. Only the Theil value suggests a trend towards a more specialised structure of local economies; this is in contrast to the finding concerning the national economy as a whole. In particular, it is worth noting that

the biggest Swedish local economies display a tendency towards a more diversified structure. However, one should bear in mind that these findings concern the shifts; on the average, the biggest Swedish local economies, both at the beginning and the end of the period, were more specialised than their Finnish counterparts.

The regions which became more specialised during the study periods were, according to all three indices, on the average less specialised at the beginning of the period than those regions in which industrial structure proceeded in the opposite direction. Using the 1990s situation as the benchmark of comparison, the finding is reversed: the group of regions which had become more specialised is also more specialised on the average. This applies to both countries. Thus, a change in the degree of regional specialisation seems to correlate negatively with the initial degree of specialisation in both countries. This observation might provide some support to the view that a regional cluster might turn into a "bad agglomeration", which tends to disappear in the long run.

**Table 4.** Changes in the indices of regional specialisation of manufacturing industries vis-a-vis changes in manufacturing employment in Finland in 1974-1993 and in Sweden in 1970-1990 (for the indices: see Endnote 3).

<b>FIN</b>	<b>Change in employment - (&lt; -34,9 %)</b>	<b>Change in employment + (&gt; -34,9 %)</b>	<b>n</b>
<b>Theil +</b>	36	74	110
<b>Theil -</b>	17	51	68
<b>n</b>	53	125	178
<b>SWE</b>	<b>Change in employment - (&lt; -16,1 %)</b>	<b>Change in employment + (&gt; -16,1 %)</b>	<b>n</b>
<b>Theil +</b>	72	75	147
<b>Theil -</b>	46	77	123
<b>n</b>	118	152	270

Table 4 presents a summary comparison of the changes in the Theil indices and manufacturing employment. Although 74 regions of the 125 which outperformed the average employment change in Finland displayed a higher Theil value in 1993 than in 1974, no straightforward conclusions can be drawn from this comparison. A closer look indicates that the correlation between the changes in index values and the percentage changes in industrial employment are, in fact, slightly negative. This finding holds true to Sweden as well. Thus, this comparison leaves the question of industrial specialisation vis-a-vis regional employment development unresolved.

In sum, it can be concluded that even though the indices of specialisation in the Finnish LMDs increased on the average, we cannot argue that enhanced regional specialisation has been an overall trend in recent decades - in Finland or in Sweden. However, the importance of regional specialisation and the role of individual sectors as such is supported by the simple observation that the share of the biggest manufacturing sector was on the average more than 50 percent in the Finnish LMDs both in 1974 and 1993. Even in those LMDs where the total manufacturing employment exceeded 5 000, and which are thus usually not dependent on an individual firm or establishment, the average share of the largest sector was more than 25 percent. In the Swedish municipalities, the biggest manufacturing sector employed on the average about 40 percent of industrial workers both in 1970 and 1990. In the largest municipalities, the role of a leading sector was even more pronounced than in Finland.

#### 4.2. Sub-periods

The 20-year periods under consideration may consist of widely different sub-periods characterised by distinctive features in terms of employment development, locational dynamics, and so forth. In the Finnish case, this was examined by calculating indices for four sub-periods. The comparison displayed an interesting turn towards increased industrial specialisation by region. The average Theil values developed in the following way:

1974	.161
-80	.150
-85	.157

-90	.164
-93	.182

During the first sub-period (1974-80), only 30 percent of the LMDs became more specialised, whereas this figure was 52 percent in 1980-85, 60 percent in 1985-90, and 80 percent in 1990-93. Thus, the shift towards specialisation seems to have already begun in the 1980s; in the early 1990s it became more prominent.

#### 4.3. Specialisation in the turbulent years

The second Finnish data set concerns the years 1988-95, which included an upturn in the late 1980s and a deep crisis in the early 1990s. In this case, indices are based on data on value added.

In the comparison of Table 5, changes in the specialisation of regions are very similar according to the three specialisation indices. More than three-quarters of the NUTS 4 regions showed a trend towards enhanced specialisation.

**Table 5.** Changes in specialisation indices in NUTS 4 in 1988-1995.

FIN		Theil		Isard		Gini		T, I, G	
Value added									
(million FIM)	n	+	-	+	-	+	-	+	-
Over 5 000	5	5	0	5	0	5	0	5	0
1 000 - 4 999	26	21	5	19	7	21	5	18	4
100 - 999	47	33	14	34	13	34	13	32	12
1 - 99	7	6	1	6	1	6	1	6	1
Total	85	65	20	64	21	66	19	61	17

The recovery from the crisis, which has occurred since 1992, varied considerably between regions; in general, GDP growth has been dependent on growth in the value added of manufacturing industries ( $r=.787$ , 1988-1995). In this process, the industrial performance of

local economies was clearly linked to specialisation, most notably in the rapidly growing centres of telecom industries. In contrast, industrial value added decreased in those NUTS 4 regions which most notably became more diversified during the study period. In sum, the turbulent years in the Finnish economy seem to have led to an accelerated process, in which the fates of old, or bad agglomerations, and those of the new clusters of spectacular growth have deviated markedly from each other.

The comparison of the changes in the specialisation indices and value added in the manufacturing industry in 1988-95 provided some support to the view that increasing specialisation may contribute to growth: in the case of the Isard indices, the correlation was significantly positive, but in the case of the Theil indices only slightly so. Table 6 summarises the findings.

**Table 6.** Changes in regional specialisation and industrial value added in NUTS 4 in 1988-1995.

FIN	Change in Value	Change in Value	n
	Added	Added	
	-	+	
<b>Isard +</b>	20	44	64
<b>Isard -</b>	7	14	21
n	27	58	85

In addition to the above observations on the NUTS 4 regions, some calculations were also made using the respective data on the NUTS 3 regions. Of these 20 regions, 17 showed increasing industrial specialisation in the 1988-95 period according to the Theil index. The two most specialised regions in 1988 also increased their specialisation most during the seven-year period.

No significant correlation concerning these data was found between industrial growth and specialisation. This is in line with the view that these regions are not functional units in terms of the mechanisms which might support specialised growth. In most cases, a NUTS 3 region includes several local economies which are very different in terms of their growth potential.



#### 4.4 Qualifications

Obviously, statistical surveys can represent only a very narrow portion of regional specialisation and industrial localisation phenomena. In addition, extensive surveys such as the one here suffer from technical and methodical constraints, which limit conclusions (see e.g. Krugman 1991).

An important problem is caused by the classification of regions. Statistical data are collected in terms of administrative regions, and the labour market districts, municipalities or NUTS 4 regions based on them are not necessarily relevant units in the analysis of industrial dynamics. It is also clear that the standard industrial classification is far from ideal in the analysis of localisation. It overlooks most upstream and downstream links between industries, and thus interconnected clusters of industrial development cannot be identified. In addition, high values of specialisation indices often reflect the small size of the region and are subject to random factors; as a result, focusing on larger regions is a more appropriate approach.

Clearly, these technical problems suffice to raise serious doubts about any definite conclusions based on the findings of statistical overviews. In addition, they can be seen as "symptoms" of even more fundamental problems in the systematic comparative analyses of regional specialisation and industrial localisation. In particular, one may ask what would be a proper criterion for defining relevant regions for an analysis of regional specialisation when various types of (static and dynamic) external economies are linked with various spatial scales. In operational terms, the problem here concerns the proximity effects of the regions, which are not incorporated in the indices; for instance, two neighbouring regions are treated as separate units, even if they might form a relevant operational environment for a certain specialised industry.

Strictly speaking, the specialisation indices which were used here do not measure regional specialisation but rather differences between regional and national industrial structures. Although the distinction is not necessarily of great importance if the point of comparison is as diversified as the USA or the whole EU, it matters in the case of a highly specialised small national economy.

## 5. Conclusions

The localisation of economic activities and the related specialisation of local and regional economies have gained increasing attention as important potential sources of competitive advantage and growth. Many case-specific investigations have revealed mechanisms of unique, and milieu-specific, dynamics of localisation and specialisation, which are also roughly in accord with theories of regional economic growth.

Although favourable preconditions for, and obstacles to, specialised growth can be related to a wide variety of factors, the role of spatial, milieu-bound factors is accentuated in most theoretical accounts: in short, geography matters. This was also an important impetus to the present analysis. In the Nordic countries, spacio-economic conditions might be seen as being less favourable to the development of specialised local and regional economies.

This paper is a preliminary attempt to depict specialisation and its trends at a regional level using three different specialisation indices and extensive statistical data. Notwithstanding the important qualifications, some tentative conclusions are possible on the basis of the observations.

First and foremost, manufacturing industries in the Finnish labour market districts and Swedish municipalities do not seem to display any clear-cut tendencies towards increased specialisation from the 1970s to the 1990s. However, it has to be emphasised here that the pattern of the 1990s cannot be extrapolated on the basis of past experience. This is especially true in the case in Finland, where a shift towards increased specialisation of local economies was observed in the 1990s, although the issue remains open whether this represents a more permanent trend or is a temporary crisis-induced phenomenon. Secondly, the observations did not give any clear-cut support to the view that specialisation would have been connected to better-than-average performance in terms of employment. Given the fact that increased specialisation of a local economy can also be a result of its deindustrialisation and stagnation, this is not at all surprising. On the contrary, it emphasises the need to analyse the dynamics of growth and the dynamics of decline separately.

On the basis of these tentative observations, trends in industrial location will be analysed on the basis of approaches which are more sector- and region-specific. In addition, the role of the international division of labour will be taken into account: is the localisation of industries linked to sectors with growing employment shares in the national economy and/or with sectors growing in importance in the global economy?

## Footnotes

1

The data from the Finnish and Swedish industrial statistics were compiled for the purposes of the Nordic project "Regional Production Systems" (see Maskell et al. 1998). Anders Malmberg (Uppsala University) kindly provided the Swedish data.

2

The data were provided by Statistics Finland for the research project "Growth Factors and Regional Economic Disparities" (Lea Pelkonen and Sakari Ylönen, University of Joensuu).

3

*The Gini coefficients* are calculated in the following way:

$$G = 0.5 - \sum_i^n (\text{lag}(\text{Cum}) * Y_i) + (X_i * Y_i * 0.5), \quad n = [1..80],$$

where  $X_i$  = the share of the sector  $i$  of the total industrial employment in a local economy  
 $Y_i$  = the share of the sector  $i$  of the total industrial employment  
 $\text{lag}(\text{Cum})$  = the lagged cumulative share of the sectors of the total local employment, ordered according to the quotient  $X_i / Y_i$

Basically, the Gini coefficient describes the deviation of the local industrial structure from the national. A diversified local economy receives a value close to zero, and the Gini value for a specialised local economy approaches 0.5.

*The Isard specialisation index* is a simple version of the same comparison:

$$I = \sum_i^n (X_i - Y_i) / 100, \quad n = [1..80],$$

where  $X_i$  and  $Y_i$  are as above, and positive differences are summed up. The values range from zero to one.

The logarithmic *Theil entropy measure* is also based on a comparison between two distributions:

$$T = \sum_i^n X_i \log (X_i / Y_i), \quad n = [1..80],$$

where  $X_i$  and  $Y_i$  are as above in the Gini coefficient. The values of the Theil index are standardised to range from 0 to 1. Compared to the Gini and Isard indices, relatively more weight is put on unlikely events (here: small sectors and regions) in the Theil index.

4

Empirical evidence on this phenomenon is provided, for example, by Krugman (1991), Enright (1993), Ellison & Glaeser (1994), Maskell & Malmberg (1995) and Isaksen (1996). However, empirical findings concerning Finland (Eskelinen & Niiranen 1997) are quite mixed: in 49 of the 80 sectors the shift was towards spatial concentration during the period 1974-93. In contrast, the spatial concentration of manufacturing industries in Sweden was higher in 61 of the 80 sectors in 1990 than in 1970.

5

The regions in the two countries fell into different size groups in very different ways. There were only two municipalities in Sweden with less than 100 industrial employees in 1990; in Finland the respective figure was 65 of 197 in 1993 - including the LMDs which had to be excluded from the analysis due to the complete lack of manufacturing activity.

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