The evolution of the geographical concentration of tertiary sector activities in Europe

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ABSTRACT

The purpose of this paper is to measure the concentration of tertiary activities in Europe. Usually, these sectors are depicted as 'invisible goods' by international economics theories. However, the expansion of the tertiary sector in developed economies, liberalisation and an increasing number of studies argue that services have a serious influence upon the economy, most notably in the field of economic geography. We will measure the concentration of tertiary sector activities, breaking this field down into 21 distinct sectors. We will show that Knowledge Intensive Business Services are highly concentrated, and are becoming even more so. This result points towards the desirability of explicitly including these activities in "NEG" (New Economic Geography) models.

RESUME

L'objet de cet article est de mesurer la concentration des activités tertiaires en Europe. Les théories d'économie internationale considèrent généralement ces activités comme des 'biens invisibles'. Cependant, la tertiarisation des économies développées, la libéralisation du secteur et un nombre croissant de travaux théoriques semblent présumer d'un rôle majeur des services sur l'économie et notamment la géographie économique. Nous mesurons la concentration des activités tertiaires en distinguant jusqu'à 21 secteurs. Nous montrons que les Services Intensifs en Connaissance présentent une concentration élevée, en niveau comme en croissance. Ce résultat va dans le sens d'une prise en compte explicite de ces services dans les modèles d'économie géographique.

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I. INTRODUCTION

Two axes characterise the distribution of economic activities in spatial terms. The economic axis attempts to define the productive structure within a given area using a single measurement, that of specialisation. Likewise, the axis of geographical or spatial distribution may be described in terms of concentration or dispersal, according to which, the sector in question is distributed in a more or less even manner over the area studied. Our study focuses on this geographical axis by studying the question of the evolution of the degree of concentration of tertiary sector activities on the European national level, with the intention of thus filling a gap in current economics research. Although research into the increasing level of concentration in the industrial sector in the EU may be relatively common[1], similar services-oriented research remains both rare and frequently lacking in depth. This is despite the fact the tertiary sector represents 70% of European output.

Two theories are generally proposed to explain this lack of interest. The first is linked to the availability and the homogeneity of the relevant data. The tertiary sector is typically less disaggregated than the industrial sector, making comparative studies difficult. Likewise, even if there may be an increasing amount of data available on this sector, difficulties remain in achieving the necessary historical perspective or a wide enough sample of different countries.

Besides these practical explanations, current thought often considers the tertiary sector to be a trend-follower rather than a trend-setter, totally influenced by industrial sector location. Starting from this base model, this image is propagated in numerous international economics models. Services are thus characterised by non-tradable, even invisible production.

This perspective is only gradually changing, despite a number of recent works (Bhagwati *et al*., 2004). The studies of Francois (1990a, 1990b), Catin & Ghio (1999) and Jennequin (2003) credit tertiary sector activity to be an important factor in the geographical distribution of economic activities. However, these studies are for the time being of relatively small influence in the field of New Economic Geography. One reason for this may be precisely the lack of research aiming to describe the evolution of concentration in service sector activities. It remains to be shown that some service activities, notably the most tradable, demonstrate increasing tendencies towards concentration coinciding with growing economic integration, in similar fashion to most industrial sector activities.

What is the impact of European integration and the liberalisation of the services sector on decisions relating to location for this sector? It is vital to reply to this question to fully understand the evolution of Europe's economic geography. Interaction between industrial and tertiary sectors is liable to produce cumulative effects as soon as the question of tertiary concentration comes into play (Jennequin, 2003). Some service sector fields may in this case have a part to play in shaping European economic geography. Moreover, the global trend towards the liberalisation of the services market and their increasing tradability will naturally widen even further the role of services in European economic geography. Like the WTO, the European Commission maintains a keen interest in the liberalisation of the services market. These two bodies believe that liberalisation stimulates not just trade in services, but also in

[1] Amongst other studies, we might refer to: Amiti (1998, 1999), WIFO (1999), Storper *et al*. (2000), Brülhart (2001), Dupuch & Jennequin (2001), Midelfart-Knarvik *et al*. (2002) and Aiginger & Davies, (2004).

goods (Deardorff, 2000; Dee, 2001; OMC, 2005)[2]. Under these circumstances, what impact should we expect as regards location of service sector activities on one hand and the economy as a whole on the other?

Our aim is to show that Knowledge Intensive Business Services (KIBS), which are amongst the most tradable (Markusen, 1989; Cortès & Jean, 1997; Windrum & Tomlinson, 1999; Muller & Zenken, 2001), are highly concentrated and are becoming even more so. Before presenting our findings, we will demonstrate in the next section the particularities and limits of a selection of studies on the concentration of service activities. We present the defining features of our study (Section 3) and our own results (Section 4) before a more exact analysis of the historical evolution of this field (section 5), an examination of a wider section of countries (Section 6) and the highest level of sectoral disaggregation available - 21 sectors (Section 7).

II. CONCLUSIONS ARISING FROM PREVIOUS STUDIES

Any study that attempts to measure the concentration of service sector activities comes up against the problem of data availability. While for the industrial sector, international databases may be plentiful and well-stocked (the UN's UNIDO, Eurostat's REGIO, DEBA/DAISIE, STAN in the case of the OECD, etc), this is not the case for tertiary activities[3]. Here, databases are insufficiently disaggregated, meaning that data gathering encounters problems as regards homogeneity and the use of tertiary sector-specific measurements. Under these conditions, there is little data available that can be used to aid in an analysis of concentration of service activities. Some databases integrate service sector data with industrial ones. In this instance, the aim is to obtain a sufficiently comprehensive overview of the extent of economic concentration over all sectors.

In order to obtain the desired homogeneity, studies frequently concentrate on one single country. Working within this framework increases data reliability and virtually removes the problem of geographical comparisons. Houdebine adopted this approach to employment data in France, mixing tertiary and industrial sector activities (Houdebine, 1999). According to his findings, the average concentration tended to diminish with the inclusion of the tertiary sector. This study covers the period 1978-1992. It therefore shows a wide spread of service sector activities in France.

In Hallet's case, the study concerns data on regional value added on a European-wide scale (Hallet, 2000). This approach has the advantage of asking a particularly important question. Does economic integration within a very large common area lead to the concentration of service sector activities in the larger regional cores? Nevertheless, any study of this kind is faced with serious problems relating to lack of data. In his study of 119 European regions, Hallet only studied five different tertiary sectors alongside twelve industrial sector activities using relative indexes[4]

[2] We should note that the theoretical effects specifically of the liberalisation of services have been relatively little studied. Analyses show that increasing opportunities for the commercialisation of services induces changes in the models of production and consumption in the economies in question (Francois, 1990a). To be more precise, three phenomena can converge during the process of liberalisation of services: development of the international division of labour, increasing specialization within countries to profit from increased returns and the International Division of Production Process within service activities. (Francois, 1990b).

[3] For an overview of data available for the study of economic concentration, see Combes & Overman (2003).

[4] Relative indexes are to be differentiated from absolute indexes. In the measurement of concentration, the latter simply offer a perspective of one particular sector leaving aside the wider situation. In contrast, relative indexes compare the situation of one sector with that of others, most frequently by drawing comparisons as regards the average.

between 1980 and 1995. The results are therefore noticeably different from the purely French-based study. Business and financial services demonstrate a high and growing level of concentration. This high concentration is also seen in other trade services whereas non-trade services, initially relatively concentrated, have tended towards dispersal over this period. Unsurprisingly, this initial overview of European tertiary sector concentration tends to underscore once again the importance of the extent of the tradability of services. Gaulier uses the same approach but limits the study to 71 European regions using data relating to value added (Gaulier, 2003). By separating economic activities into three sectors (agriculture, industry and services), he demonstrates that the tertiary sector has tended towards dispersal between 1980 and 1996. Moreover, he finds that service industries are only slightly less concentrated than secondary sector activities, contrary to expectations.

The Midelfart-Knarvik *et al*. study (2002) specifically incorporates five different services sectors, this time on a national scale. The results differ somewhat from Hallet's (2000) which was more centred on European regions. In fact, although the transport sector is the most dispersed, it is the only sector to have witnessed increasing levels of concentration. In order of increasing concentration, comes wholesale and retail trade, communications and restaurants and hotels. These three sectors demonstrate stability in terms of concentration. The financial services and business services sectors may well be the most concentrated, but this concentration has tended to lessen since 1980, despite the fact the intermediary sector is a relatively tradable sector which should as a consequence be particularly affected by European integration. However, no such trend towards concentration is observed. Our study, on the other hand, does not come to this same finding.

Unlike previous studies, Jennequin & Rabaud (2006) adopted a relatively similar approach to that taken by this paper, using the same indexes but concentrating on the impact of European integration on the economies of both the Middle Eastern and North African (MENA) and the European Neighbourhood Policy Countries. Their findings, which examine up to 10 tertiary activity sectors, show that service industries currently appear to be more dispersed in trading zones (UE15, NMS, MENA) than in the Mediterranean Euro zone countries as a whole, whereas KIBS are relatively concentrated.

In the final analysis, it seems very problematic to postulate a definite conclusion regarding the evolution of the agglomeration of services in Europe. If the studies examined here allow a first formulation of the different positions adopted and shed a little light onto the subject, the disaggregations used in the sectoral breakdown remain too imprecise, especially given the diversity of the tertiary sector. It is partially in order to plug the gap in this field that we have decided on a study exclusively devoted to this sector.

III. DATA AND KEY CHARACTERISTICS OF OUR STUDY

To assess the evolution of the concentration of the European tertiary sector, we chose to use employment data rather than value added or trade data. On one hand, an assessment of the value added sphere is difficult to apply to some tertiary activities (education, public administration) which in turn makes comparison with other sectors difficult. The problems related to comparisons between sectors in terms of value added in tertiary production are numerous. The use of employment data may not completely solve the problem of productivity differentials between sectors, but we believe they are the best measure of the evolution of a given sector, as well as facilitating sectoral comparison. Moreover, insofar as we 'focus' on the tertiary sector, differences in productivity between industry and the service sector are not taken into consideration.

On the other hand, including trade data will favour *ex ante* tradable tertiary activities. The other service sectors also have their role to play in international economic geography and we wish to take this into account.

We have used the OECD's STAN database. The list of activities taken into account was decided on the basis of the ISIC (International Standard Industrial Classification of all Economic Activities) Rev. 3. We will only examine the service industries. Two indexes will be used, one absolute, the other relative.

The Herfindahl absolute index of geographical concentration compares the distribution of employees in each sector according to a geographical division of *m* countries. By adopting the notation *n*, the total number of sectors, N_k^i the number employed in sector *k* in country *i* and $N_k^{\bullet}$, the number employed in the sector in the totality of countries taken into account ($N_k^{\bullet} = \sum_{i=1}^{m} N_k^i$). The Herfindahl index is written thus:

$$H_k = \sum_i \left(\left(\frac{N_k^i}{N_k^{\bullet}} \right)^2 \right) \qquad (1)$$

Insofar as the number of countries *i* is between 1 and *m*, the values of this index are found between 1/*m* and 1. The value of 1 is obtained when the sector is present in only one country (maximum concentration). By its structure alone, it can be understood that this index is highly influenced by the input of the larger sectors. These do indeed have a disproportional weighting due to the squared exponent. This criticism leads us to introduce the relative Gini coefficient based on the job share of each sector in each country[5].

The Gini coefficient is not in itself an index. It permits the creation of a graph showing concentration on the basis of a relative index[6]. We will use the *K-spec* or Krugman index, represented by the following mathematical expression:

$$KRUG_k = \sum_i \left| \frac{N_k^i}{N_k^{\bullet}} - \frac{N_{\bullet}^i}{N_{\bullet}^{\bullet}} \right| \qquad (2)$$

This is a relative index insofar as one compares a situation in a given country or sector with that of the average for the selection studied. The values of this index are sited between 0 for a perfectly homogeneous geographical distribution (as regards employees) and 1 where sector *k* has a totally different concentration from that of other sectors. The final expression of the Gini Coefficient is therefore described thus:

$$G_k = 1 - \sum_{1=1}^{m} \left[\sum_{i=1}^{1+1} \frac{N_{\bullet}^i}{N_{\bullet}^{\bullet}} - \sum_{i=1}^{1} \frac{N_{\bullet}^i}{N_{\bullet}^{\bullet}} \right] \times \left[\sum_{i=1}^{1} \frac{N_k^i}{N_k^{\bullet}} + \sum_{i=1}^{1+1} \frac{N_k^i}{N_k^{\bullet}} \right] \qquad (3)$$

The first stage of our paper will consist, as in the study by Midelfart *et al*. (2002), in proposing an extended range of tertiary sector activities. Subsequently, as a result of the too small number of sectors studied, we will extend our analysis in three additional directions. We will thus seek successively to extend the length of period studied, to increase the number of European countries involved and then to refine the sectoral classification as much as possible. We will then see that the business services sector stands out by its high and increasing levels of concentration compared to other sectors.

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[5] For a more in-depth analysis of the statistical properties of different indexes relating to specialisation and concentration, we suggest the analyses of Valeyre (1984), Jayet (1993), and more recently, Duranton & Overman (2002), reprised and added to in Combes & Overman (2003) and Overman *et al*. (2003).

[6] It is also possible to calculate the Gini coefficient on the basis of an absolute, rather than a relative index (Haaland *et al*. 1999, Gordo *et al*., 2003). However, this solution does not take into account sector size and requires a homogeneity in the elements studied, which proportionally reduces the impact of the results obtained (Combes & Overman, 2003).

IV. THE INITIAL APPROACH

Midelfart-Knarvik *et al*'s study, (2002) describes five separate service branches. However, these five branches do not cover the whole range of service activities. Community, social and personal services are not included under this umbrella. We have chosen for our initial approach a comprehensive breakdown of tertiary sector activities. We therefore propose the five following distinct sectors: wholesale and retail trade, restaurants and hotels; transport, storage and communication; finance, insurance, real estate and business services; public administration and defence, compulsory social security; education, health, social work and other community, social and personal services.

Another departure from the Midelfart *et al* study (2002) is the number of countries studied. While their study dealt with only the EU15 countries, we took a deliberate decision to include the CEEC in our analysis in order to better evaluate the impact of the integration of economies – and therefore also of liberalisation in the services market, particularly relevant in the CEEC (Dupuch *et al*., 2002) – on the concentration of services. Examining five sectors allows us to include a total of eleven European countries in the analysis: Austria, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Norway, Poland and Sweden[7]. In this way we include three NMS from the CEEC. Graph 1 following shows the results obtained with the Herfindahl absolute index (top graph) and the Gini coefficient (bottom graph).

Right from this first table, we are able to make an initial assessment of concentration in the services sector. Firstly, globally speaking, the trend is towards a very slight increase in the concentration of tertiary sector activities, with the Herfindahl Index value going from 0.195 to 0.198 over a nine-year period[8]. Moreover, this increase is relatively erratic, since the period 1994-1998 is marked by stagnation in the concentration of services in these eleven European countries. This very slight increase in the value for the totality of tertiary sector activities brings us to examine a different set of tertiary activities.

The Herfindahl value increases in all three branches studied: community and social services (public administration, defence, health, education), restaurants and hotels, and the finance and business services sector. The latter remains the most concentrated sector in the eleven countries in the study, even if this concentration, which peaked in 1994 with a value of 0.225, diminished afterwards up to 1998. As for the other sectors, the decreasing concentration of the trade and transport sectors (the most dispersed of all) is noteworthy and contributes to the limiting of the overall level of concentration in the tertiary sector.

Lastly, due to the break-down into five sectors and the availability of data, it is difficult to establish equally-sized sectors. Thus, the restaurant and hotels sector represents 6% of all jobs in the sample. At the other end of the scale, unsurprisingly, community and social services (administrative services, defence, education, health) are the largest branch with a little over 40% of the employment sample[9] and are a major influence on the overall average. Taking account of the fact that the smaller sectors tend to show higher index values than the larger sectors, two elements should be noted. The concentration of the restaurant and

[7] We decided to keep Norway in our analysis, even though this country is not an EU member state. The close economic relationship of this country with EU member states led us to include it in our sample, especially as Norway tends to apply the measures concerning liberalisation of services as prescribed by both the WTO and the European Commission. The telecommunications sector is a good example of this evolution. We also felt obliged to drop Sweden and the United Kingdom from the study due to inconsistencies relating to some years in some branches.

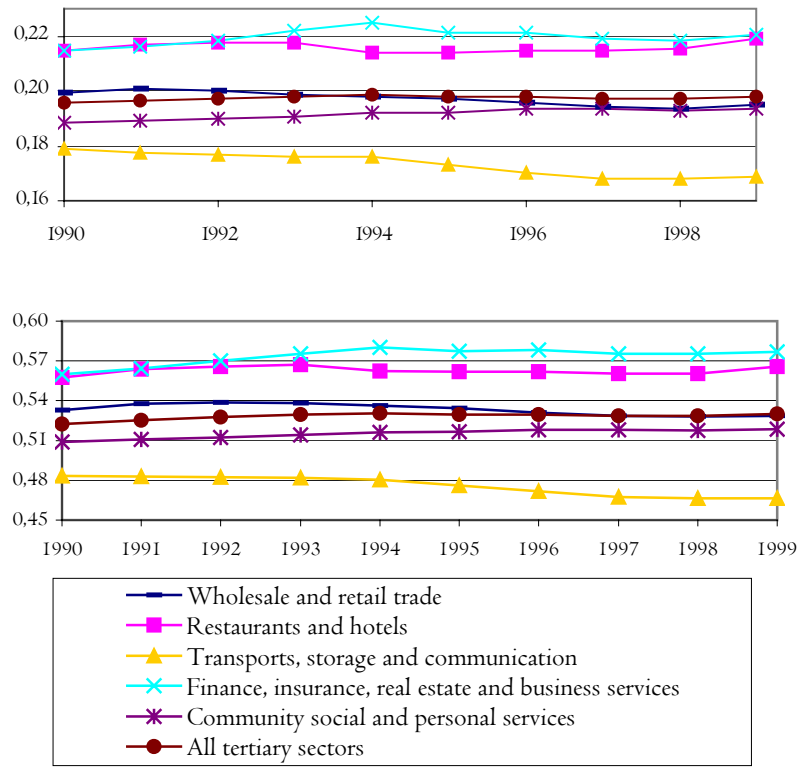
[8] Here we are dealing with an average of the indexes from different sectors weighted according to the share of each sector in the total jobs figure in this sample.

[9] The three other sectors represent respectively between 10 and 20% of the employment totals of our sample group.

hotels sector could potentially be overestimated because of the greater degree of relative disaggregation in this sector. Likewise, the concentration in the area of community services could be under-estimated.

GRAPH 1

Evolution of the degree of concentration of 5 tertiary sectors: initial approach - Herfindahl index (top) and Gini coefficient (bottom)



The evolution seen in the Gini coefficients adds to the previous results. It should be recalled that the use of relative indexes allows comparisons to be made between one sector's share in a country and the share of this same sector in the totality of countries studied[10]. As is often the case, the same trends can be seen whether absolute or relative indexes are used. The most striking result is probably the concentration of the finance and business services sector, where the high level of concentration is clearer in relative than in absolute terms[11]. However, if the concentration of this sector shows a marked increase up to 1994, a relative stagnation sets in following this date. The final period studied might permit us to predict a new increase, already discernable using the absolute index.

[10] It should not however, be thought that the relative index permits comparisons to be made between the level of concentration of the sector studied and the average level of concentration in other sectors. It is indeed share of employment that is being compared here.

[11] One sector may be more concentrated than another in absolute terms but less in relative terms. The distinction arises from the model of concentration. In fact, absolute indexes tell us nothing about the way in which a sector is concentrated. Consequently, two sectors could be very highly concentrated in absolute terms but not heavily concentrated in the same countries. As a result, if the distribution of service activities of one of the two sectors differs noticeably from the average of the other sectors taken all together, then this sector will demonstrate a more marked relative concentration than the other sector. This situation can be noted in 1991, for example, with business services, where the geographical distribution of employment *compared with other sectors*, is more marked that of the restaurant and hotels sector. Conversely, during the same year, the latter sector's index value was greater than that of business services in absolute terms.

This initial approach has the advantage of supplying a preliminary assessment of the evolution of concentration in the tertiary sector in Europe. However, it can only be a partial assessment due to the lack of data regarding service industries, there being three reasons linked to this. First, the period studied does not allow us to propose a wider historical perspective of concentration. Secondly, an approach that included a larger number of countries would offer a more exact picture of the European situation. Lastly, it seems particularly interesting to refine the sectoral classification in order to evaluate changes occurring within the tertiary service areas mentioned above. As a result, we chose to carry out a step-by-step analysis in order to present the evolution of the concentration of tertiary activities in the most comprehensive way possible. Naturally, these multiples analyses are affected by constraints resulting from the availability of data or otherwise, with the result that each study must be considered in the light of its initial aim rather than as an attempt to instantly understand the current state of concentration in the European tertiary sector. Thus, each of the following sections will add further descriptive elements regarding the concentration of services in the EU[12].

V. INEVITABLE LIMITATIONS TO THE HISTORICAL APPROACH

The first step is to extend the period analysed. Even if the 1990s are especially interesting in an analysis of European integration and liberalisation in service industries, including an examination of the shift towards service industries since the 1970s offers the opportunity to explore the historical development of European tertiary concentration. Unfortunately, data from the 1970s is scarce, with the result that we must content ourselves with studying a limited number of countries.

Thus, the study is limited to just six European countries (the Czech Republic, Denmark, Finland, France, Italy and Norway[13]) over the period 1978-1999, along with eight sectors. As a consequence, the results thus obtained cannot be seen as an exact measure of the evolution of European tertiary sector concentration during this period. Nonetheless, the findings are sufficiently important to merit study and they will provide useful information for subsequent work in this area.

If limiting the study to six countries is somewhat restrictive, the inclusion of eight sectors, on the other hand, will offer a more detailed picture of variations in tertiary concentration. Community services, initially too closely grouped together, have now been divided into three groups, the most important of which scarcely tops 14% in the sample at the end of the period studied.

Table 1 shows the results we get with the Herfindahl absolute index between 1978 and 1999. Also shown are the variations in this index for the periods 1978-1999 and 1986-1999.

Overall, the index reveals a slight reduction in concentration over the period studied. However, this reduction is not constant, as service activities became more concentrated between 1985 and 1992, before the situation stabilised during the 1990s. At sectoral level, the results are more clear-cut.

The large majority of tertiary sectors (six out of eight) witnessed a reduction in levels of concentration over this 21-year period. The biggest reduction was seen in the sector that had been most concentrated at the beginning of the study period: transport and communication. The two most concentrated activities at the end of the study period were once again financial and other business services. This latter sector showed a

[12] More particularly, the number of sectors examined will be eight, which will lessen the influence of the largest sector, notably in the calculation of average tertiary sector concentration.

[13] The decision to include the Czech Republic in the study during the time prior to its period of economic transition (1978-1990) may seem questionable. However, as with other countries, this period as a whole was one of increasing integration for this country.

rather uneven development in this area, tending towards greater dispersal until 1982. The level of concentration reached in 1986 was at that time the biggest change over a four-year period, previous changes having been much less drastic.

TABLE 1

Herfindahl absolute index of the degree of concentration of tertiary sector activities in six European countries[14]

Tertiary Sectors	1978	1986	1990	1995	1999	Variation 78-99 (86-99)
Wholesale and retail trade, repairs (50-52)	0,332	0,336	0,338	0,326	0,327	-1,5% (-2,6%)
Hotels and restaurants (55)	0,346	**0,355**	**0,361**	**0,359**	0,351	**1,7%** (-1,1%)
Transport and storage and communication (60-64)	0,293	0,290	0,287	0,291	0,292	-0,3% (0,8%)
Financial Intermediation (65-67)	**0,383**	**0,371**	**0,372**	**0,362**	**0,366**	-4,5% (-1,3%)
Real estate, renting and business activities (70-74)	0,351	0,330	0,351	0,355	**0,355**	**1,0% (7,6%)**
Education (80)	0,338	0,330	0,331	0,330	0,327	-3,1% (-0,9%)
Health and social work (85)	0,278	0,272	0,273	0,280	0,275	-1,2% **(1,1%)**
Other community, social and personal services (90-93)	**0,364**	0,329	0,307	0,328	0,332	-8,8% (0,8%)
Total services[15] (50-93)	*0,328*	*0,322*	*0,325*	*0,325*	*0,325*	*-1,1% (0,7%)*

Source: STAN OECD, author's calculations

This analysis is supplemented by table 2, which shows the Gini relative coefficients for the same data.

TABLE2

Relative Gini coefficient of the degree of concentration of tertiary sector activities in six European countries

Tertiary Sectors	1978	1986	1990	1995	1999	Variation 78-99 (86-99)
Wholesale and retail trade, repairs (50-52)	0,491	0,498	0,501	0,499	0,495	0,8% (-0,6%)
Hotels and restaurants (55)	0,512	**0,522**	0,530	**0,538**	0,529	**3,3%** (1,3%)
Transport and storage and communication (60-64)	0,437	0,432	0,431	0,443	0,441	**1,0%** (2,0%)
Financial Intermediation (65-67)	**0,566**	**0,550**	**0,552**	0,532	**0,539**	-4,8% (-2,1%)
Real estate, renting and business activities (70-74)	0,528	0,509	**0,533**	**0,538**	**0,531**	0,6% **(4,3%)**
Education (80)	0,510	0,498	0,500	0,492	0,482	-5,6% (-3,3%)
Health and social work (85)	0,403	0,394	0,396	0,412	0,407	0,9% **(3,3%)**
Other community, social and personal services (90-93)	**0,539**	0,502	0,467	0,487	0,489	-9,2% (-2,6%)
Total services[15] (50-93)	*0,487*	*0,481*	*0,485*	*0,489*	*0,485*	*-0,4% (0,8%)*

Source: STAN OECD, author's calculations

[14] In this and subsequent tables, the numbers in bold indicate the largest values during each year.

[15] This label includes all service activities except codes 75, 95 and 99, representing respectively, public administration and defence, private households with employed persons and extra-territorial organisations and bodies, for which there is insufficient data.

The general trends hold steady by comparison to the absolute indexes of table 1[16]. The same is true, for example, of variations on the overall level of concentration of tertiary activities taken all together. Likewise, financial services and business services remain the most concentrated sectors. Their geographical distribution is the most distinct from that of the other sectors in the sample as a whole. Lastly, health and wholesale and retail trade services display stability in terms of the level of their relative concentration over this extended period, thus remaining relatively dispersed sectors.

Several sectors bear witness to a relative evolution distinct from the preceding absolute evolution. This is the case for wholesale and retail trade, transport & communication and the health sectors. Although these activities have tended towards dispersal (a lowering of the values of absolute indexes), their geographical distribution has nonetheless shifted away from the average for other sectors (an increase in the relative index).

Even if these findings can lay claim to be of only relatively limited impact due to the fact only six countries have been studied, the results obtained from this period of over 20 years are certainly instructive. We can see that the evolution of tertiary sector concentration is as a whole very slight. While the absolute index records a small decrease, the relative index demonstrates a relative stability, rendering the evolution of the concentration of services too small to be significant. On the other hand, an increase, associated with a high level of concentration in the business services sector, was noted over this period. Likewise, financial services activities are particularly concentrated, despite a significant decrease at this level. The following section aims to continue the research begun in the previous section by examining a larger number of countries. We will then be able to see if the conclusions reached previously are still valid.

VI. A RECENT PERSPECTIVE ON THE SITUATION IN EIGHTEEN EUROPEAN COUNTRIES

After having extended the period of analysis, we wished, in this section, to add a larger number of countries to our analysis so as to offer as precise a picture as possible of concentration in the European services sector. This improvement comes with a restricting factor. The period to be analysed must be shortened because data for all eight sectors previously studied are not available for all 18 countries before 1995[17]. Consequently, we will study the period 1995-99.

Table 3 displays the results that we obtain with the Herfindahl absolute index as well as the variation between the years 1995 and 1999.

The two sectors that we have already highlighted in previous tables once again demonstrate the highest levels of concentration. However, their development is now different. While the level of concentration in the business services sector increases slightly, financial services activities tend towards greater geographical dispersal. This result in this recent time period derives from the introduction of the CEEC to our sample. In fact, whereas the large European states (France, Germany) experienced an absolute decrease in their staffing levels in this field, the CEEC showed the biggest increases in this area, notably in Poland and Slovakia, with respectively 24% and 23% more employees hired between 1995 and 1999. Insofar as the index of concentration decreases, this change indicates a dispersal of financial activities over the territory of the EU25. The key question will be whether this development, with its element of

[16] Insofar as this table shows a relative coefficient, the variations and changes in the time dimension noted are smaller because the elements denoting job share are initially divided by the average of all the other sectors.

[17] These countries are, in alphabetical order: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, the Republic of Ireland, Italy, Luxemburg, the Netherlands, Norway, Poland, Portugal, Slovakia and Spain.

'catching up', will become a permanent feature, or will integration have the same effect as with the EU15, with a particularly concentrated financial sector dating from 1970 on.

TABLE 3

Herfindahl absolute index of the degree of concentration of tertiary sector activities in eighteen European countries

Tertiary Sectors	1995	1999
Wholesale and retail trade, repairs (50-52)	0,133	0,129
Hotels and restaurants (55)	0,134	0,137
Transport and storage and communication (60-64)	0,120	0,115
Financial Intermediation (65-67)	**0,151**	**0,145**
Real estate, renting and business activities (70-74)	**0,151**	**0,152**
Education (80)	0,118	0,117
Health and social work (85)	0,136	0,140
Other community, social and personal services (90-93)	0,142	0,144
Total services[15] *(50-93)*	0,135	0,134

Source: STAN OECD, author's calculations

Overall, concentration in absolute terms tends to decrease. This progression would need to be confirmed in relative terms because of the very slight variations recorded (table 4).

In fact, the results are similar. One particular point bears noting. The sector including some tourist-related activities (hotels and restaurants) demonstrates, at best, stability as to its relative concentration. However, table 3 led us to conclude there had been a significant rise in its absolute concentration. The comparison between the two measures allows us to conclude that in this sector, a shift towards greater concentration has occurred, but one which does not run counter to the average geographical distribution of other tertiary activities.

TABLE 4

Relative Gini coefficient of the degree of concentration of tertiary sector activities in eighteen European countries

Tertiary Sectors	1995	1999
Wholesale and retail trade, repairs (50-52)	0,559	0,550
Hotels and restaurants (55)	0,564	0,563
Transport and storage and communication (60-64)	0,517	0,504
Financial Intermediation (65-67)	**0,588**	**0,580**
Real estate, renting and business activities (70-74)	**0,606**	**0,609**
Education (80)	0,518	0,513
Health and social work (85)	0,552	0,555
Other community, social and personal services (90-93)	0,554	0,565
Total services[15] *(50-93)*	*0,557*	*0,555*

Source: STAN OECD, author's calculations

It would ultimately seem that the two most concentrated tertiary sectors in Europe are financial services and business services. At the other end of the scale, the fields of education and transport and communication demonstrate a persistent trend towards dispersal, showing a lack of any particular national influence impacting on these sectors with a strong equivalence between places of production and consumption. This equivalence does not seem to apply to financial services or business services that have a greater impact on international trade.

After having extended the period of analysis, then included a larger number of countries in our study, we have one last stage to carry out, namely the refinement of the sectoral break-down of our sample.

VII. A MORE PRECISE SECTORAL STUDY

The depth offered by a historical perspective of tertiary sector concentration that starts in 1978 and the inclusion of the largest possible country sample for this study may have provided useful additional results, but it remains important to provide a more precise picture of the situation in this sector.

Most studies make do with a small number of tertiary sectors, generally five. We have instead worked, in part of this study, with eight sectors. Now, we are going to widen our sample to twenty-one distinct tertiary sectors[18]. Inevitably and in similar fashion to the two previous sections, we see that this further break-down results in new limitations on the use of the other variables. For this reason, this study will deal with seven European countries: Denmark, Finland, France, Germany, Hungary, Italy and Norway. This sample has the advantage of including three large European states (France, Germany and Italy) whilst also including a new EU member state. The study covers a longer period than that of the previous study, the years 1991-1999.

As before, we will display the results obtained from the Herfindahl absolute index before assessing the differences with the relative index. Table 5 shows the first results.

The different branches have been set out according to their sectoral classification. In this way we have successively displayed wholesale and retail trade, hotels and restaurants (50-55), then transport, storage and communication (60-64), followed by financial intermediation (65-67), real estate, renting and business activities (70-74) and community, social and personal services (75-93). The branches displaying the greatest degree of concentration within each sector can thus be analysed. The conclusions of this table may be broken down into four elements.

First of all, the results for the water transport branch (61) are worth noting. This sector is both the most concentrated, but also the sector that has seen the greatest increase in concentration during the 1990s. Moreover, the difference in level of concentration with the other sectors is especially noticeable.

This situation is explained by two reasons. The first reason results from the characteristics of companies featured in this branch. The need for the close presence of natural resources leads to a high concentration in countries which have the largest navigable waterways (France and especially Italy). Here we can see the Heckscher-Ohlin approach to the distribution of economic activities. The location of production must coincide with the location of the most intensively used resources. This sector is perhaps one of the only tertiary branches to have this particular characteristic. The second reason is empirical. This sector is the smallest of the 21 sectors in the study. It represents only 0.6% of the workforce in our sample, compared with nearly 13% for the largest sector. As a result, the likelihood of obtaining a higher value is greater than in other sectors.

Secondly, the health sector stands out for the rapid increase in levels of concentration. Although it remains relatively dispersed in light of the average of the other tertiary sectors, this growth is significant. It is precisely this sector that boasts the greatest share of the workforce in our sample group (11.9% in 1991 and 12.9% in 1999). This increased share comes from countries such as Germany and Norway, where staffing levels have risen by more than 25% over this period. In contrast, numbers in Finland, Hungary and to a lesser extent, Italy, have remained stable in this field. Consequently, the efforts of some countries in this sector should be interpreted not as an attempt to 'catch up' with other countries, but as a sign of a real desire to strengthen and develop their health sector.

[18] The employment statistics relating to the telecoms sector come from the database of the International Telecommunications Union (ITU).

The French position in this area seems more muted, with growth in employment levels of less than 12%.

TABLE 5

Herfindahl absolute index of the degree of concentration of tertiary sector activities broken down into 21 sectors and 7 European countries[19]

Tertiary sectors	1991	1999	Variation 91-99
Motor trade and repairs (50)	0,291	0,281	-3,44%
Wholesale and commission trade (51)	0,287	0,288	0,30%
Retail trade and repairs (52)	0,287	0,295	2,74%
Restaurants and hotels (55)	0,292	0,300	2,61%
Land transport, transport via pipelines (60)	0,265	0,257	-2,74%
Water transport (61)	**0,418**	**0,490**	**17,29%**
Air transport and auxiliary transport services, travel agencies (62-63)	0,276	0,269	-2,53%
Post (641)	0,290	0,244	-15,78%
Telecommunications (642)	0,277	0,276	-0,17%
Financial intermediation (65)	0,289	0,304	**5,39%**
Insurance and pension funding (66)	**0,330**	**0,338**	2,39%
Auxiliary financial services (67)	**0,331**	**0,335**	1,22%
Real estate services (70)	0,275	0,299	**8,77%**
Renting and Other business activities (71 & 74)	**0,303**	**0,316**	4,41%
Computer and related activities (72)	0,286	0,283	-1,07%
Research and development (73)	**0,312**	**0,320**	2,50%
Public administration and defence (75)	0,294	0,290	-1,48%
Education (80)	0,256	0,256	0,14%
Health and social work (85)	0,259	0,280	**8,09%**
Sanitary and similar services, Membership organisations n.e.c. and other personal services except 92 (90, 91 & 93)	0,268	0,264	-1,30%
Recreational and cultural services (92)	0,265	0,278	**5,00%**
Total Services[15] (50-93)	*0,275*	*0,277*	*0,74%*

Source: STAN OECD, author's calculations

Thirdly, the most widely dispersed sectors appear to be those most influenced by proximity to demand such as the postal sector, land transport and education[20]. In fact, all these sectors have become

[19] The five highest levels of concentration for each year have been marked in bold.

[20] It is noteworthy that the education sector stands out for the very wide range of developments within our sample countries. While Norway (+17.6%), followed by France (+11.8%) and Finland (+10.2%) have increased employment levels in this sector between

increasingly dispersed since 1991, most notably the postal sector. This sector was particularly affected by a sharp reduction in staffing numbers in Germany.

TABLE 6

Relative Gini coefficient of the degree of concentration of tertiary sector activities broken down into 21 sectors and 7 European countries[19]

Tertiary sectors	1991	1999	Variation 91-99
Motor trade and repairs (50)	0,533	0,509	-4,64%
Wholesale and commission trade (51)	0,520	0,527	1,31%
Retail trade and repairs (52)	0,527	0,537	1,81%
Restaurants and hotels (55)	0,535	0,549	2,53%
Land transport, transport via pipelines (60)	0,499	0,476	-4,60%
Water transport (61)	**0,592**	**0,643**	**8,55%**
Air transport and auxiliary transport services, travel agencies (62-63)	0,505	0,495	-1,96%
Post (641)	0,512	0,448	-12,47%
Telecommunications (642)	0,503	0,490	-2,74%
Financial intermediation (65)	0,526	0,551	**4,67%**
Insurance and pension funding (66)	**0,559**	**0,570**	1,85%
Auxiliary financial services (67)	**0,584**	**0,596**	1,96%
Real estate services (70)	0,506	0,547	**8,25%**
Renting and Other business activities (71 & 74)	**0,554**	**0,568**	2,63%
Computer and related activities (72)	0,524	0,515	-1,78%
Research and development (73)	**0,564**	**0,581**	2,96%
Public administration and defence (75)	0,536	0,525	-2,12%
Education (80)	0,468	0,466	-0,40%
Health and social work (85)	0,468	0,498	**6,50%**
Sanitary and similar services, Membership organisations n.e.c. and other personal services except 92 (90, 91 & 93)	0,496	0,489	-1,51%
Recreational and cultural services (92)	0,492	0,508	**3,27%**
Total Services[15] (50-93)	*0,501*	*0,502*	*0,16%*

Source: STAN OECD, author's calculations

Lastly, financial and business services once again have the highest levels of concentration (except for the water transport sector already mentioned above). Furthermore, the financial intermediation sector and

1991 and 1999, Hungary (-2.6%) and Italy (-5.3%) have reduced their specialisation in this sector.

real estate activities, which are not among the activities showing greatest levels of concentration, nevertheless showed an important increase in their degree of concentration. These developments underscore once more that these sectors stand out for their greater degree of agglomeration compared to other tertiary sectors. In these same sectors, it is worthwhile to highlight the degree of concentration reached by R&D activities. With an index value of 0.32, this sector is the fourth most heavily concentrated in the sample group. This result may be compared to a certain extent with the results found for the concentration of innovating activities as seen in several studies (Autant-Bernard & Massard, 1999; Paci & Usai, 2000a, 2000b; Breschi & Lissoni, 2001; Lallement *et al*., 2002) but contradicts the findings of Peri (1998) and Gaulier (2003).

Exactly the same conclusions as those reached on the basis of absolute indexes can be found using the relative index (table 6). This confirms the four main findings we have already examined. Furthermore, education is the only branch to show an increase in the absolute index coupled with a decrease in the relative one. This situation demonstrates a greater agglomeration of the sector, which tends to tie in with the geographical distribution of other tertiary sector activities. However, given the limited extent of the variations in question, these developments are not very significant.

VIII. CONCLUSION

The study of the concentration of services has helped us collate information that is vital to better analyse European economic geography. This interaction between secondary and tertiary sector activities encourages us to take a closer interest in the distribution of service activities, an area which has rarely been studied in detail.

A general trend towards an increase in concentration of tertiary sector activities seems to emerge from the different studies we have carried out, although this increase is a very moderate one, visible only after 1986, a key date in European political and economic integration. Amongst the sectors studied, the same conclusion was reached time and again: business services, together with financial activities, are the most agglomerated sectors.

This result can be tied into similar studies into the manufactured sector. The same conclusions can be reached as regards business services and the secondary sector. Our findings thus bring further light to shine on the relationship between industry and KIBS (Teece, 1986; Francois, 1990b). We can see that through the links between industrial sector and KIBS, the question posed by the location of activities continues to evolve.

One consequence is seen in the wake of these different findings. If KIBS, by their location, can encourage regional dynamism (Moyart, 1997, 2004), they can just as easily lead to a movement towards spatial concentration between core and peripheral regions. Whether it is a matter of deciding factors in location, economic mechanisms influencing interaction between industry and KIBS, or territorial differences, most notably following the appraisal of a greater concentration in both of these two sectors, the development of business services raises a number of fundamental questions which are deserving of specific and in-depth theoretical study. The study of the effects of economic integration (and of the current and future liberalisation of the services sector) on the spatial distribution of economic activities, the effects resulting from interaction between secondary and tertiary sectors, the impact of the location of one of these sectors upon a second and impact KIBS have upon regional development are all questions that may be understood using NEG models (Jennequin, 2003). The stakes are all the higher for peripheral regions seeking to start and maintain a dynamic process of development on home ground.

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