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The Geographical Concentration of Industries

Author Name(s): **Cecilia Campos, Regional Economic Analysis**

Abstract

This article is the first of a series that will examine both the geographical concentration of industries and the industrial specialisations of local authority areas. This first article highlights industries that display geographic concentration and briefly explains why it occurs and its implications. The degree of geographical concentration of industries was measured using three indicators: the Herfindahl-Hirschman index, the locational Gini and the Maurel and Sedillot index. The indicators were computed using employment data for Great Britain at local authority level derived from the Business Register and Employment Survey and micro-level data derived from the Business Database Structure.

Summary

This article looks at the geographical distribution of employment by industry. The aim of this article is to distinguish between industries in which employment is geographically concentrated in a small number of areas and industries in which employment is more evenly spread across areas.

The results show that:

- At an aggregated industry level, mining and quarrying is the most concentrated industry. Finance and insurance activities, information and communication, and professional, scientific and technical activities also show high levels of geographical concentration.
- At a disaggregated industry level, industries that are geographically concentrated are mostly knowledge intensive service industries, as well as a variety of supporting services and activities.
- In the cases described above, the geographical concentration occurs through the co-location of large numbers of individual firms within each industry.
- Geographical concentration can also occur if an industry is dominated by a small number of large plants. This is most commonly observed in utilities industries and in manufacturing industries.
- The wholesale and retail trade, human health and social work, education, and construction industries are among the least concentrated.

The pattern of geographical concentration has a number of implications for the economy. For example, there is evidence to show high geographical concentration (either via industrial clusters or within cities) often has a positive impact on productivity. However, geographical concentration

will also lead to an uneven economic geography, which has implications for spatial inequalities. The article, therefore, includes a section that explains why geographical concentration occurs and some of the implications for individuals and policy makers.

The article also includes a section entitled 'Interpreting the results', which aims to provide guidance for users wishing to examine the full underlying results from the analysis. These full results are available in the accompanying data reference tables and are provided down to a 272 industry split. Maps and analysis of the spatial patterns of the geographical concentration identified in this article will follow in a subsequent article.

In terms of how the results in this article were produced, the method chosen was to calculate three different measures of geographical concentration. These were based on employee jobs data, at local authority level, derived from the Business Register and Employment Survey, and plant-level data derived from the Business Database Structure. Both datasets refer to 2010.

The three measures of concentration calculated are: the Herfindahl-Hirschman index, the locational Gini and the Maurel and Sedillot index. Although these measures can be used alternately, they can also be used together to provide additional evidence. The Herfindahl-Hirschman index is an absolute measure of concentration that compares the distribution of employment in an industry with a uniform distribution.

The locational Gini is a relative measure that compares the geographical distribution of employment in an industry with the distribution of total employment in the economy. The Maurel and Sedillot index indicates whether the industry-specific employment is more or less concentrated in a small number of areas compared to the distribution of total employment (similar to the locational Gini), but it also takes into account the size distribution of plants in the industries.

Results by 21 industry split

The aim of the results is to show which industries display geographical concentration and which industries do not. In other words, which industries have employment concentrated within a relatively small number of local authorities and which industries have employment much more evenly spread across local authorities[1].

Results presented are based on the UK Standard Industrial Classification of Economic Activities (SIC 2007), which classifies businesses according to their economic activity. In this section, results are presented based on a 21 industry split; and in the next section results are presented on a 272 industry split.

A number of different measures of geographical concentration have been calculated, namely the Herfindahl-Hirschman index (HHI), the locational Gini and the Maurel and Sedillot index. The results show that mining and quarrying is, for all the measures, the most concentrated industry. However, it should be noted that this is only a small industry in employment terms, accounting for just 0.2 per cent of GB employee jobs.

Some larger service industries also show, for all the measures, high levels of geographical concentration, these being finance and insurance activities, information and communication, and

professional, scientific and technical activities. This means that employment in these activities tends to be localised in a relatively small number of local authorities. These industries account for a combined 14.5 per cent of GB employee jobs.

Industries that show the least geographical concentration include wholesale and retail trade, human health and social work, education, and construction (this is the case regardless of the indicator chosen). Indeed, employment in these industries is more evenly spread across local authorities than total employment. These industries generally produce or distribute goods and services that serve local customers and need therefore to be located close to local populations.

Figure 1: Geographical concentration of main industry sections

Great Britain, 2010
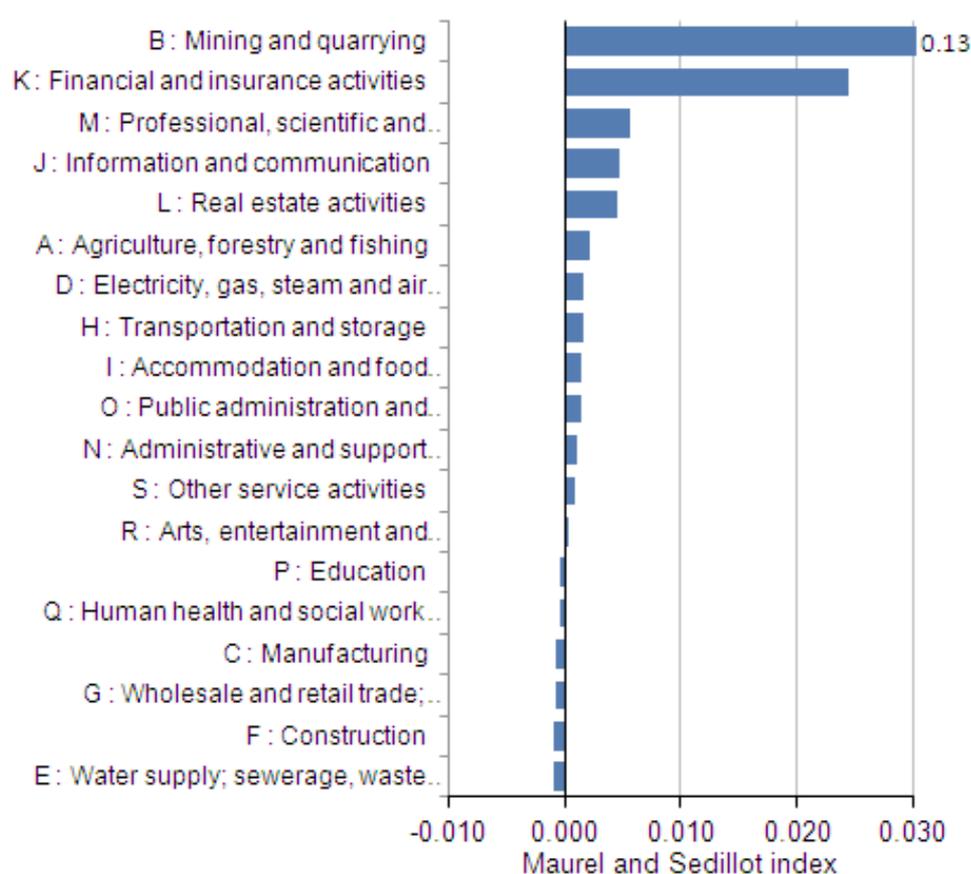
Source: Office for National Statistics

Notes:
1. A higher value of the Maurel and Sedillot index corresponds to a greater degree of geographical concentration.
2. Note the value of the Maurel and Sedillot for mining and quarrying is 0.1288; a much higher value than any other industry. The bar corresponding to the mining and quarrying exceeds the maximum value chosen for the X-axis.

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(46.5 Kb)

The results above focus on industries where concentration (or lack of it) occurs across a high number of firms. In other words, where an industry is concentrated, it is because a large proportion of the many firms in the sector are found to be located in relatively few areas. However, it is also possible that geographical concentration can occur due to employment in an industry being concentrated in just a small number of plants (known as industrial concentration)[2]. This is the case for the electricity, gas, steam and air conditioning supply industry.

This section examined the most aggregated industry level (sections) of the SIC 2007 that provide a broad summary of the industrial structure of the economy. It is also possible to examine more disaggregated data giving a fuller range of specific industries. This can provide additional information that is not clear from the more aggregated data. The next section, therefore, presents results for a 272 industry split (three-digit code industry level) to see if measuring geographical concentration at this more disaggregated level leads to additional conclusions.

Notes

1. In this article only a-spatial measures of geographical concentration are presented. In other words, this article does not look at the spatial patterns of concentration. These spatial patterns, which show for example the area(s) of the country in which an industry is concentrated, will be investigated in a subsequent article.

2. The Herfindahl index for industrial concentration is presented on the data reference tables accompanying this article. The higher the value of the index, the more employment is concentrated in a small number of plants.

Results by 272 industry split

Following on from the previous results section, this section presents a similar analysis but using more disaggregated data, in this case the 272 groups of industries, also referred to as three-digit code industries in the UK Standard Industrial Classification (SIC). The results show the most concentrated and the most dispersed three-digit code industries, ranked according to either the Maurel and Sedillot index or the locational Gini; and the findings are compared with the results presented in the previous section.

The key difference between the Maurel and Sedillot index and the Gini coefficient is that the Maurel and Sedillot index corrects for industrial concentration. This means industries that have a high rank in the Maurel and Sedillot index are industries in which employment is concentrated within a few geographical areas and within these areas the employment is spread across a relatively large number of firms. By contrast, while an industry may have a high Gini coefficient for the same reason, a high Gini coefficient can also be due to a high level of industrial concentration which describes the situation where employment in the industry is geographically concentrated because it is an industry with a small number of very large plants.

Table 1 shows the thirty industries in which employee jobs are most geographically concentrated, according to both the Gini coefficient and the Maurel and Sedillot index. Only industries with more than 25,000 employees are included.

Table 1: Top 30 geographically concentrated industries (according to both the Gini coefficient and the Maurel and Sedillot index)

Great Britain, 2010

Ranking position	Locational Gini	Maurel and Sedillot index
1	511 : Passenger air transport	663 : Fund management activities
2	291 : Manufacture of motor vehicles	511 : Passenger air transport
3	301 : Building of ships and boats	941 : Activities of business, employers and professional membership organisations
4	303 : Manufacture of air and spacecraft and related machinery	661 : Activities auxiliary to financial services, except insurance and pension funding
5	663 : Fund management activities	591 : Motion picture, video and television programme activities
6	103 : Processing and preserving of fruit and vegetables	731 : Advertising
7	553 : Camping grounds, recreational vehicle parks and trailer parks	662 : Activities auxiliary to insurance and pension funding
8	552 : Holiday and other short stay accommodation	641 : Monetary intermediation
9	352 : Manufacture of gas; distribution of gaseous fuels through mains	651 : Insurance
10	212 : Manufacture of pharmaceutical preparations	301 : Building of ships and boats
11	204 : Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	691 : Legal activities
12	201 : Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms	811 : Combined facilities support activities
13	732 : Market research and public opinion polling	900 : Creative, arts and entertainment activities

Ranking position	Locational Gini	Maurel and Sedillot index
14	101 : Processing and preserving of meat and production of meat products	732 : Market research and public opinion polling
15	293 : Manufacture of parts and accessories for motor vehicles	649 : Other financial service activities, except insurance and pension funding
16	110 : Manufacture of beverages	701 : Activities of head offices
17	261 : Manufacture of electronic components and boards	581 : Publishing of books, periodicals and other publishing activities
18	651 : Insurance	293 : Manufacture of parts and accessories for motor vehicles
19	822 : Activities of call centres	553 : Camping grounds, recreational vehicle parks and trailer parks
20	281 : Manufacture of general purpose machinery	303 : Manufacture of air and spacecraft and related machinery
21	721 : Research and experimental development on natural sciences and engineering	103 : Processing and preserving of fruit and vegetables
22	141 : Manufacture of wearing apparel, except fur apparel	522 : Support activities for transportation
23	491 : Passenger rail transport, interurban	692 : Accounting, bookkeeping and auditing activities; tax consultancy
24	360 : Water collection, treatment and supply	702 : Management consultancy activities
25	108 : Manufacture of other food products	411 : Development of building projects
26	941 : Activities of business, employers and professional membership organisations	352 : Manufacture of gas; distribution of gaseous fuels through mains
27	811 : Combined facilities support activities	822 : Activities of call centres
28	351 : Electric power generation, transmission and distribution	141 : Manufacture of wearing apparel, except fur apparel

Ranking position	Locational Gini	Maurel and Sedillot index
29	271 : Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	551 : Hotels and similar accommodation
30	139 : Manufacture of other textiles	201 : Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms

Table source: Office for National Statistics

Table notes:
1. This table only includes industries with more than 25,000 employees.
2. The three digit codes are the codes for each industry within the Standard Industrial Classification.

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The results for the Gini coefficient show that sixteen of the thirty industries listed are manufacturing industries with manufacture of motor vehicles, ships and boats, and aircraft, as well as pharmaceuticals and chemicals, all displaying high levels of geographical concentration. A number of utilities such as water collection, treatment and supply and electric power generation, transmission and distribution are also in the list.

Examine the Maurel and Sedillot results, and many of these manufacturing and utilities industries are no longer in the list. This implies that the geographical concentration within these manufacturing and utilites industries largely takes the form of industrial concentration, with employment concentrated in a small number of large plants.

By contrast, industries showing geographical concentration according to the Maurel and Sedillot index are industries in which employment is spread more evenly over a larger number of firms, and where these firms tend to be concentrated together in a small number of areas. While some manufacturing industries are also found in this list, most of the industries are knowledge intensive service industries.

These include industries related to financial and insurance activities such as fund management activities; professional, scientific and technical activities such as advertising and legal services; and media activities such as motion picture, video and television programme activities. Other industries in the list include a variety of services and activities that support business operations and are vertically related with some of the aforementioned industries, as is the case of activities auxiliary to financial services, support activities for transportation, and activities of business, employers and professional membership organisations.

Overall, there are clear similarities between these results and those shown in the previous section for the more aggregated industry split. Most of the industries in Table 1 fall into either finance and insurance activities, information and communication, or manufacturing. In the case of finance and insurance activities, and information and communication, this corresponds to the results for the aggregated industry. This is less the case for manufacturing, where individual industries tend to show far greater geographical concentration than does the manufacturing industry overall. For more information on why this is the case, please see the 'Interpreting the results' section.

Table 2 shows the thirty industries in which employee jobs are least geographically concentrated, according to the locational Gini. Again, only industries with more than 25,000 employees are included.

Table 2: The 30 least geographically concentrated industries (according to the locational Gini coefficient)

Great Britain, 2010

Ranking position	Locational Gini
137	471 : Retail sale in non-specialised stores
136	477 : Retail sale of other goods in specialised stores
135	561 : Restaurants and mobile food service activities
134	960 : Other personal service activities
133	476 : Retail sale of cultural and recreation goods in specialised stores
132	563 : Beverage serving activities
131	862 : Medical and dental practice activities
130	889 : Other social work activities without accommodation
129	853 : Secondary education
128	931 : Sports activities
127	852 : Primary education
126	475 : Retail sale of other household equipment in specialised stores
125	432 : Electrical, plumbing and other construction installation activities
124	452 : Maintenance and repair of motor vehicles
123	467 : Other specialised wholesale
122	472 : Retail sale of food, beverages and tobacco in specialised stores

Ranking position	Locational Gini
121	412 : Construction of residential and non-residential buildings
120	881 : Social work activities without accommodation for the elderly and disabled
119	531 : Postal activities under universal service obligation
118	682 : Renting and operating of own or leased real estate
117	433 : Building completion and finishing
116	949 : Activities of other membership organisations
115	451 : Sale of motor vehicles
114	493 : Other passenger land transport
113	841 : Administration of the State and the economic and social policy of the community
112	855 : Other education
111	829 : Business support service activities n.e.c.
110	879 : Other residential care activities
109	842 : Provision of services to the community as a whole
108	871 : Residential nursing care activities

Table source: Office for National Statistics

Table notes:

1. This table includes only industries with more than 25,000 employees.
2. The three digit codes are the codes for each industry within the Standard Industrial Classification

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A common thread through the industries listed in Table 2 is the need for the production of these goods or services to occur close to the population they serve. So, whether it is the provision of retail services or restaurants, or the provision of education or social work activities, the distribution of employee jobs in these industries is relatively spread across the whole of the country, in order to reflect their need to directly serve local populations.

The results above have indentified some types of industries that have employment geographically concentrated and some that do not. The next section looks at the questions of why such geographical concentration occurs and why it is of interest.

Understanding geographical concentration

Why does it occur?

The results illustrate that employment in some industries is spread relatively evenly across all areas of the country, whilst for some other industries employment is concentrated within a relatively small number of local authorities. Why is this the case?

Geographically concentrated industries tend to produce tradable goods or services (or are vertically linked to such industries). By contrast, there is little concentration for firms that need to be close to customers. In other words, there is a distinction between those industries that need to be located close to their customers (e.g. hairdressers cannot all locate in one part of the country – they need to be spread out in a similar pattern to the population), and those industries that do not need such close location to customers (e.g. car manufacturing plants or film production activities).

However, this doesn't explain why industries that don't need to locate very close to their customers should often choose to concentrate in a small number of areas, rather than locate randomly across the country. Yet, such concentration is seen in certain industries and, indeed, is fundamental to the existence of agglomerations of economic activities, e.g. within cities.

These concentrations are the cumulative result of numerous individual location decisions by businesses. In other words, they only occur because many businesses have all individually made the decision they would rather locate close to other businesses in their industry (or complementary industries or a city), rather than spatially apart from them. As such, a second key point is that each of these businesses must view the benefits of such co-location as being greater than the costs.

There are various ways to explain such behaviour. For example, New Economic Geography models show how a spiky economic geography can occur through market mechanisms alone given certain assumptions, most notably an economy displaying increasing returns to scale and monopolistic competition. Additionally, some non-market mechanisms also seem to play a large role in bringing about geographical concentration, in particular intangibles such as information spillovers.

Overall, the benefits arising to firms from geographical concentration can be loosely described as productivity benefits occurring through the three channels first described by Marshall in 1890. These are 1) the existence of specialised providers of industry inputs; 2) a thick (as in large) local market for specialised labour skills and 3) the existence of information spillovers. The underlying mechanisms involved in each of these channels continue to be the subject of ongoing study in the academic literature.

Why does it matter?

To an individual, it matters because the pattern of geographical concentration of industries influences the economic opportunities available in the area in which they live. A potential employee

faces a very different labour market according to whether they live in rural Wales, an ex-industrial city such as Sheffield, or in Inner London.

To a policy maker, meanwhile, the geographical concentration of economic activity matters because it may have an impact on the amount of economic growth in the economy. This concentration of economic activity may entail industrial clusters, or it may simply entail the high level of economic mass (agglomeration) seen in cities. Either way, there is evidence to suggest productivity is (or can be) higher in areas where economic activity is geographically concentrated. As such, there is always significant interest in understanding the manner in which such productivity benefits occur, and whether or not they can or should be encouraged or developed via policy.

Another reason policy makers may be interested is if they wish to address the economic inequalities that result from an uneven economic geography. For example, there may be a wish to try to improve the economies of areas that are currently performing poorly economically, or there may be a wish to redistribute income across areas to reduce the inequalities in incomes between residents of different areas.

This article has only looked at which industries are geographically concentrated, and sought to briefly explain why this may occur and why it is of interest. A further article will expand on these themes and will provide more detail of different types of geographical concentration that can occur, as well as looking at the actual spatial patterns of the geographical concentration of different industries. A third article will use the same data to examine the industrial specialisms of an area and will seek to look at the contrasting issues of specialisation, diversification and resilience.

The remainder of this article goes into further detail on the data used for the analysis in this article and the methodology adopted. It also provides some advice on how to interpret the results that are included in the accompanying data reference tables as a guide for those wishing to examine the data in more detail.

Data

In the absence of production and trade data at sub-national level, employment or jobs data can be used to measure the degree of geographical concentration of industries. This analysis uses the number of employee jobs derived from the Business Register and Employment Survey and micro-level data derived from the Business Database Structure.

Business Register and Employment Survey (BRES)

This analysis uses employee jobs estimates derived from the Business Register and Employment Survey 2010, which is the primary source for jobs estimates at a detailed geographical and industrial level[1]. BRES contains information on the number of jobs by industries down to five-digit industrial classification as defined in the UK Standard Industrial Classification (SIC 2007) and by geographic area down to local authority. Estimates are subject to sampling error, which increase as geographic areas become smaller and industry classification become more detailed. In this article, analysis is limited to local authority level data and to the 272 industry split, i.e., the three-digit code industry level from the UK Standard Industrial Classification 2007.

The BRES data used in this article is for employee jobs. These differ from workforce jobs in that self-employed jobs, HM Forces and Government supported trainees are not included in employee job data.

Business Database Structure (BSD)

This analysis also uses detailed information on the size of plants in order to assess the degree of industrial concentration, needed to compute the Maurel and Sedillot index. That information was derived from the ONS Business Structure Database (BSD) of 2010. The BSD is a version of the Inter-Departmental Business Register, which is the key sampling frame for UK business statistics. The BSD provides a wide variety of firm demographics, of which the number of employees, postcode location and five-digit industry code were used in this article.

For consistency purposes, the Maurel and Sedillot index was calculated using local authorities as the geographic unit. The five-digit code industries were aggregated to three- and two-digit code industries and to sections level to compute the index for the various levels of industry aggregation. Only live units were used in the analysis. Of the 2,711,446 live local units in the BSD 2010, only those with matching local authority were selected. The total number of local units in the analysis is 2,691,632.

Notes

1.   For more information about BRES and how it compares with other available sources of employment and jobs please follow this [BRES link](#).

Methodology

There are a number of different measures that can be used to summarise concentration of economic activity. This article uses the Herfindahl-Hirschman index, the locational Gini and the Maurel and Sedillot index to estimate geographical concentration of employment by industry in Great Britain. The chosen measures characterize concentration in discrete space in different ways, and combined together they provide a good means to understand the distribution of industries across the country.

The Herfindahl-Hirschman index (HHI) is an absolute indicator and it determines, for each industry, how uneven the distribution of employment is when compared with a uniform distribution. The locational Gini is a relative measure and it indicates the extent to which the spatial distribution of the employment in a specific industry deviates from a reference structure. The reference structure used in this analysis to compute the Gini coefficient is the distribution of total employment across local authorities in Great Britain.

The third measure of geographical concentration used is the Maurel and Sedillot index, which is a measure of geographical concentration that controls for differences in the size distribution of plants and thus allows isolating the cases where high geographical concentration is a result of spatial clustering of many plants from the same industry, rather than just a small number of very large plants.

The Herfindahl-Hirschman index

The first indicator employed in this analysis is the Herfindahl-Hirschman index (HHI), a commonly used absolute measure of concentration. This indicator is used to measure both geographical and industrial concentration. The Herfindahl index for industrial concentration will be explained when describing the Maurel and Sedillot index later in this section.

The Herfindahl-Hirschman index for geographical concentration compares the distribution of employment in one industry with a uniform distribution in which employment is equally spread across all the regions. The HHI for geographical concentration of industry i is given the following expression:

Equation 1

$$HHI_i = \sum_{r=1}^{R} S_r^2$$

The description for this equation is currently unavailable. ONS apologises for any inconvenience caused.

Where Sr is the share of industry employment in region r. The value of the HHI increases with the degree of concentration reaching its upper bound of 1 when all the employment in the industry is concentrated in one region. HHI takes the lowest value 1/R, where R is the number of regions, when industry employment is evenly distributed across all the regions. As an absolute measure, this indicator displays a weighting towards large regions. It would work best for equally sized regions, but local authorities are not equally sized and as such local authorities with larger shares of employment, have a larger influence on the HHI value.

The locational Gini

The second indicator computed is the locational Gini, a relative indicator that determines the degree of concentration of a specific industry in comparison to a reference structure rather than to a uniform distribution. The reference structure used in this article is the distribution of total employment across the 380 local authorities in Great Britain. The Gini coefficient, widely used in the analysis of income inequality, has more recently been adopted by economic geographers in the analysis of the geographic distribution of the economic activity. The expression for the locational Gini for geographical concentration of industry i is given by

Equation 2

$$G_i = \frac{1}{2} \sum_{r=1}^{R} \sum_{s=1}^{S} X_r X_s \left| \frac{S_r}{X_r} - \frac{S_s}{X_s} \right|$$

The description for this equation is currently unavailable. ONS apologises for any inconvenience caused.

where Xr(s) is the share of national employment in region r (s) and Sr(s) is the share of industry employment in region r(s). The locational Gini takes values between 0 and 1. The coefficient takes the value zero if the industry's employment is located in each local authority in the same proportion as total employment. The coefficient takes values greater than zero if the distribution of the industry's employment is more skewed than that of total employment.

If total employment is not uniformly distributed, then an industry which is uniformly spread across all local authorities will appear to be concentrated in areas with little other employment. In contrast with the HHI which gives greater weight to large regions, the locational Gini, as a relative measure, gives greater weight to small areas.

Both measures, the HHI and the locational Gini, signal concentration if an industry is overrepresented in a local authority. This overrepresentation may be a result of location decisions, where a large number of small plants decide to locate close to each-other, or it may simply be the result of industrial concentration, where employment is highly concentrated in a small number of very large plants. Because neither the HHI nor the locational Gini allow to adequately comparing industries that have different market structures, they both fail to control for industrial concentration.

The Maurel and Sedillot index

The third indicator used in this analysis is the Maurel and Sedillot index. The Maurel and Sedillot index can be interpreted as the geographical concentration in excess of that which might be expected given the industrial concentration. In other words, the Maurel and Sedillot index indicates whether the industry-specific employment is more or less concentrated in a small number of areas compared to the distribution of total employment and given the size distribution of plants in the industries.

The Maurel and Sedillot index comprises two main components: a measure of 'raw' geographical concentration denoted by G and a measure of industrial concentration, the Herfindahl index for industrial concentration. The Herfindahl index for industrial concentration is similar to the HHI for geographical concentration, but it determines the degree of concentration of employment in single plants rather than in geographic units. The expression of the Herfindahl for industrial concentration is given by

Equation 3

$$H = \sum_{i=1}^{N} Z_i^2$$

The description for this equation is currently unavailable. ONS apologises for any inconvenience caused.

where Z_i is the share of plant i in total industry activity, given N plants in the industry. The value of the Herfindahl index depends on both the number of plants in the industry (N) and the size distribution of those plants. The value of the Herfindahl index is higher the smaller the number of firms, and takes its minimum value of 1/N when all the plants are equally sized.

The 'raw' geographical concentration component of the Maurel and Sedillot index takes the following expression

Equation 4

$$G = \frac{\sum_{j=1}^{M} S_j^2 - \sum_{j=1}^{M} X_j^2}{1 - \sum_{j=1}^{M} X_j^2}$$

The description for this equation is currently unavailable. ONS apologises for any inconvenience caused.

Where Sj is the share of industry employment in region j and Xj is the share of national employment in region j. The raw geographical concentration measure G is, in conceptual terms, similar to the locational Gini; it compares the geographic distribution of employment in an industry (measured by Sj) with the geographic distribution of total employment (measured by Xj). When the distribution of industry-specific employment is less skewed than the distribution of total employment, G is negative.

G takes the value zero if both distributions are equally skewed (This does not mean that the location patterns of industry-specific employment and total employment have to be the same). G is positive if the distribution of industry-specific employment is more skewed than that of total employment. When an industry is localised in a single region, geographical concentration is at its maximum and the value of G is close to 1.

The Maurel and Sedillot index can be interpreted as the geographical concentration (G) in excess of that which might be expected given the industrial concentration (H). The Maurel and Sedillot index is represented by the expression

Equation 5

$$MS = \frac{G - H}{1 - H}$$

The description for this equation is currently unavailable. ONS apologises for any inconvenience caused.

According to the Maurel and Sedillot index, an industry is regarded as localised if the geographical concentration of its plants exceeds the one that would be expected if the choices regarding the location of plants were independent. Plants in an industry may choose their location to benefit from either, natural advantages of a particular area or from spillovers generated by the proximity of other plants; in which case there is a positive correlation between location choices.

For industries with an even distribution of employment across all regions, both G and the Maurel and Sedillot index take on negative values. For localised industries, the Maurel and Sedillot index takes positive values. When an industry is localised in a single region, G takes on values close to 1 and so does the Maurel and Sedillot index.

It is important to notice at this point that these three measures of concentration are a-spatial measures, i.e., they do not provide any information regarding patterns of location. A high positive value of any of these measures means that the industry is concentrated in a small number of areas, but it does not specify whether those areas are close to each other or are far apart. The analysis of the locational patterns of the distribution of employment by industry will be presented in forthcoming articles.

Interpreting the results

The aim of this section is to provide some guidance on how to interpret the results that are included in the accompanying data reference tables. The data reference tables include the Herfindahl-Hirschman index (HHI), the Gini coefficient and the Maurel and Sedillot index for all the industries down to three-digit code of the UK Standard Industrial Classification (SIC 2007).

The tables also include, for each measure, a ranking of the industries. All the measures were computed using employee estimates at local authority level. For further details on the data used and the measures presented please see the sections 'Data' and 'Methodology'.

This section briefly examines a couple of issues related to interpreting the results. First are issues concerning comparing results for disaggregated and aggregated industries; and second are issues related to the interpretation of those cases where the three measures of geographical concentration appear to provide contradictory results.

The level of industry disaggregation

All the measures are sensitive to the level of industrial aggregation. The more disaggregated is the industry level, the greater tend to be the values of the indicators. This happens because these measures, when calculated for more aggregated industry levels, do not entail any information regarding the distribution patterns of sub-industries. Often these sub-industries can be more geographically concentrated than the aggregated industry.

Consider an industry D which can be disaggregated into two equally sized industries D1 and D2 with all the employment of D1 is in the north of the country whilst all the employment of D2 is in the south of the country. For the aggregated industry D employment is evenly spread across the country and its value for geographic concentration is low. For D1 and D2 the geographic concentration is high.

Alternatively, consider the diagram below. It shows three equally sized regions and two industries, A and B, with 6 plants each (represented by the rectangular forms in the diagram). All the plants in industries A and B have the same number of employees. Employment in industries A and B is, therefore, evenly distributed across the three regions. In this case, the locational Gini and the HHI will take on their minimum values, showing no geographical concentration in any of these industries.

However, when disaggregating industries A and B into sub-industries Ai and Bj (with i= 1, 2, 3 and j= 1, 2), one can see that the patterns of distribution are quite different. Each sub-industry Ai is concentrated in only one of the regions, while sub-industries B1 and B2 are evenly distributed across the three regions. Measures of geographical concentration for each sub-industry Ai will take on the maximum values, while those for sub-industries Bj will take on the lowest value. The average

level of concentration of sub-industries Ai is therefore greater than zero, while the average level of concentration of sub-industries Bj is still close to zero.

Geog_Concentration_Fig2
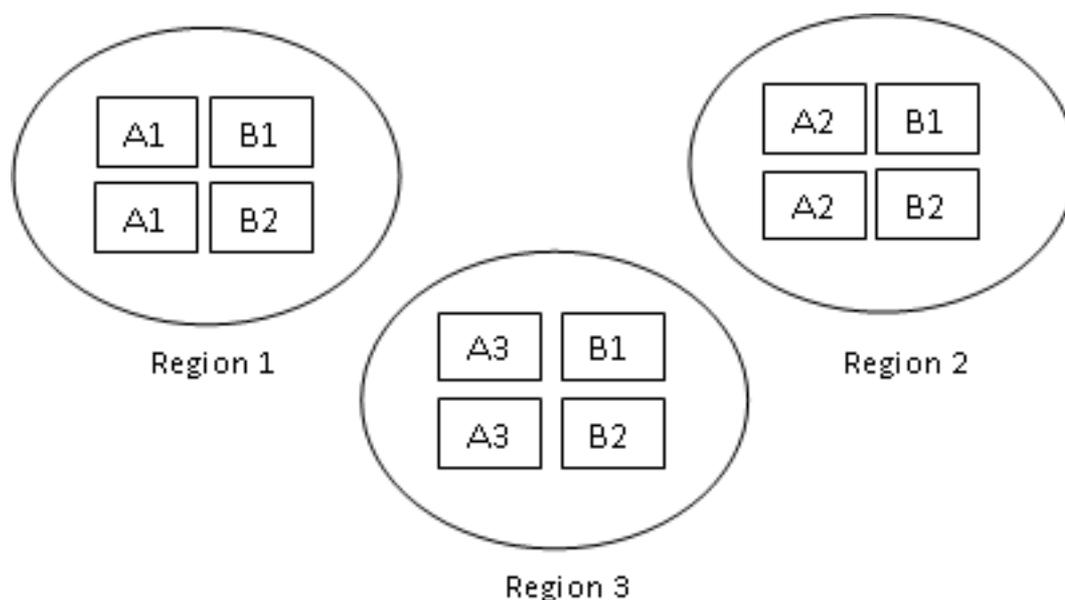
This illustration has two purposes. First, it shows why the values of these measures tend to be greater at lower levels of industry disaggregation. Second, it shows the case where an industry A can have a low value of geographical concentration whilst hiding pronounced patterns of concentration at lower level of aggregation, e.g., A1, A2 and A3.

Analysis at highly aggregated industry level may obscure pronounced patterns in certain types of industries, and it should therefore be complemented with the information provided at more disaggregated industry levels. Take as an example transportation and storage (section H of the SIC 2007).

The value of the Gini coefficient for the industry is relatively low (0.28), but the mean Gini of the sub-industries (the two-digit code industries) within transportation and storage is much higher (0.60). This means that, although at aggregated level, the distribution of employment in transportation and storage is relatively similar to that of total employment, some of the sub-industries are highly localised in a small number of local authorities.

Indeed, at two-digit code level, land transport and transport via pipelines, and postal and courier activities have a relatively low Gini value (0.25 and 0.33, respectively), whilst water and air transport have high Gini coefficients (0.81 and 0.94, respectively). The patterns of concentration are even more pronounced at a lower level of industry disaggregation; half of the three-digit code industries within transportation and storage have Gini coefficients higher than 0.80.

The Herfindahl-Hirschman index and the locational Gini

It is interesting to notice some cases of industries for which the values of the HHI and locational Gini seem to be contradicting. It is very important to keep in mind that the HHI and the Gini compare the

distribution of employment in one industry with different reference structures. Whilst, the HHI uses the uniform distribution as the reference structure[1], the locational Gini uses the distribution of total employment in Great Britain.

For example, water supply; sewerage, waste management and remediation activities has a very low HHI value[2] but, an average Gini value. This means that employment in this industry is relatively evenly spread across all local authorities in Great Britain. However, because total employment is not uniformly distributed, when using the locational Gini, employment in this industry appears as being geographically concentrated. This happens if there is a relatively high proportion of employment in this industry in local authorities that have relatively low levels of other activity.

Manufacturing is another example of an industry that shows considerable difference in the results of the HHI and the Gini coefficient. Manufacturing goes from being the fourth most dispersed industry according to the HHI index, to be the sixth most concentrated industry according to the Gini coefficient. This means that manufacturing is relatively uniformly spread across all areas of the country; however, the distribution of employment in this industry is relatively more localised from that of total employment.

There is a combination of two factors that explain these results. First, manufacturing industries may tend to have relatively high proportion of employment in areas that have relatively low levels of other activity and second, there is a small proportion of manufacturing industries in the very populated urban local authorities, e.g., cities.

The locational Gini and the Maurel and Sedillot index

The third point to stress refers to those cases of industries that show high values for Gini but low values for the Maurel and Sedillot index. The Maurel and Sedillot index compensates for industrial concentration, which neither HHI nor Gini do. Compensating for industrial concentration enables isolating the cases where employment is highly concentrated as a result of spatial clustering of a large number of plants rather than in a few very large plants. Therefore, if an industry has a high value in the Maurel and Sedillot index, it is because there is geographical concentration of a large number of plants.

If an industry has a high value of the Gini coefficient but a much lower ranking in the Maurel and Sedillot index, this suggests the industry displays industrial concentration and has a small number of relatively large plants. This is the case of the utility industries, for instance. According to the Gini coefficient, electricity is the second most concentrated industry. However, its relative position drops to seventh when using the Maurel and Sedillot index.

Similarly, water supply, sewerage, waste management and remediation activities is the fifth most concentrated industry according to the Gini coefficient and the most dispersed according to the Maurel and Sedillot index. This occurs because these industries consist of a few relatively large plants, and whilst the Gini coefficient does not correct for the size distribution of the industries, the Maurel and Sedillot does.

The Maurel and Sedillot index uses a measure of industrial concentration – the Herfindahl index for industrial concentration – to correct for the size distribution of the industries. For more explanation

on the Maurel and Sedillot index please read the 'Methodology' section. The results of the Herfindahl index for industrial concentration are presented in the data reference tables accompanying this article and it can be used to assess the level of industry concentration.

Notes

1. Employment is said to be uniformly distributed if the share of total employment is the same for all local authorities.

2. Mainly due to waste collection, treatment and disposal activities and materials recovery, which accounts for 72 per cent of the industry and it has a very low HHI value.

Background notes

1. This work contains statistical data from ONS which is Crown Copyright. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

2. Details of the policy governing the release of new data are available by visiting www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html or from the Media Relations Office email: media.relations@ons.gsi.gov.uk

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