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## **Some issues with enterprise-level industry classification: Insights from the Business Structure Database**

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There has been an ongoing debate as to whether the size of the manufacturing sector in the UK is being understated in official statistics. This paper discusses how the methodology employed to allocate an enterprise to an area of economic activity can potentially disguise the extent to which enterprises are engaged in secondary activities. The methods used to classify single site and multi-site enterprises are discussed. We then consider the reasons why the classification of enterprises may change over time. Such changes may occur due to the use of agency workers, off-shoring, technological changes, demographic events or other factors that could affect the balance of employment between local units or the classification of individual local units.

Finally, we use information from the Business Structure Database in an attempt to quantify the number of people employed in secondary areas of activity. Specifically, we identify the proportion of people who work in complex organisations characterised by local units with different industrial classifications. We identify the proportion of people working in local units whose economic activity differs to that allocated to the enterprise. Utilising this information, we observe the degree to which employment in specific areas of economic activity can be over or under-estimated. The characteristics of enterprises which change their industrial classification are compared to those that don't and an attempt is made to test some of the hypotheses concerning the reasons for change.

### ***The Classification of Single Site Enterprises***

The Standard Industrial Classification (SIC) was first introduced into the United Kingdom in 1948 for use in classifying business establishments and other statistical units by the type of economic activity in which they are engaged. The classification provides a common framework for the consistent collection, tabulation, presentation and analysis of data on economic activity. It aligns with the European nomenclature, NACE, although the UK version is more detailed.

In general, ONS classifies enterprises according to their dominant activity at the local unit level. The level of employment at the local unit is used as a proxy measure for the volume of activity being undertaken at that site. For approximately 95% of

manufacturing enterprises that consist of a single local unit which both produces and sells the business' output, the classification of such an enterprise is straightforward. If over half of an enterprise's workers are manufacturing then the enterprise's classification will be manufacturing; if over 50 per cent of the firm's employees were involved in retailing to the public then classification would be distribution and services (retail). However, where the local unit is not homogenous, any secondary activity at the local unit is hidden. For example, a retailer that has an on-site bakery would have its activity as retailing and the production of bread would not be identified.

Eurostat guidelines relating to the development and harmonisation of business registers for statistical purposes<sup>1</sup> define a statistical unit that increases the degree of granularity with which information on the activities of businesses is recorded. Referred to as the 'kind of activity unit' (KAU), the KAU groups all the parts of an enterprise contributing to the performance of an activity at class level (four digits) of NACE Rev 1 and corresponds to one or more operational subdivisions of the enterprise. This unit of observation is not a requirement for national business registers. Given the difficulties associated with enterprises being able to identify KAU and then to provide accurate information for these units such on topics such as the value of production, intermediate consumption, employment costs and investment, KAU is operationalised within the IDBR only for the more complex enterprises.

Even within the 'straightforward' case of a single site enterprise, the allocation of the enterprise to a single area of economic activity could result in secondary areas of the organisation's business (as represented by employment in non-dominant activity) being disguised, where the enterprise does not recognise this as a separate local unit. As with other types of data collected from enterprises, the accuracy with which data on business activity can be recorded will reflect the level of detail with which businesses can realistically be expected to provide accurate information without increasing costs of compliance.

### ***The Classification of Multi-Site Enterprises***

Around 5 per cent of larger firms have complex structures, where activities are spread out across a number of local units (LU) which may be in different geographical locations. Importantly these enterprises provide a large amount of manufacturing activity. In such enterprises, the dominant SIC is allocated on a digit-by-digit, top-down basis. Table 1 presents the structure of a hypothetical company comprising of four local units. In terms of classifying this enterprise to a single area of economic activity, it can be seen that at the 2 digit level of SIC, the largest number of employees are working within local units that are classified to SIC 52. Despite Local Unit A being the single largest local unit within this enterprise structure, SIC 52 is larger (in terms of local unit employment) than SIC 33. Within SIC 52, 5211 is larger than 5221 and within this 52111 is larger than 52112. Thus, the dominant SIC is 52110.

**Table 1: Enterprise Classification: Example 1**

Local Unit	SIC Code	Employment
A	33500	45
B	52111	20
C	52112	10
D	52210	25

<sup>1</sup> the EU Regulation on Statistical Units (EEC 696/93)

The result is that with the majority of employment in retailing a dominant SIC of retailing is selected and within retailing the same dominance rule applies. Having identified a dominant SIC, up to three secondary SIC codes are identified using the same rule.

The use only of the single dominant SIC code at the level of the enterprise within mixed enterprises, i.e. ones that have a mixture of local units in different sectors will mean that economic activity in non-dominant areas of employment will be disguised. Within the above example, the enterprise is classed as distribution and services even though 45% of its employment is in manufacturing. Table 2 provides a further example of how the actual level of activity within manufacturing could be understated. The dominant SIC code in this case is 52111. The enterprise is allocated to services despite the fact that employment within manufacturing based local units is higher. In this case, manufacturing activities are spread out over a more diverse range of manufacturing industries while its service activities are all within one broad industry.

**Table 2: Enterprise Classification: Example 2**

Local Unit	SIC Code	Employment
A	33500	40
B	29410	15
C	52111	25
D	52210	20

In this case, the dominant activity is retailing with 52111 chosen and the three other three are designated as secondary.

This is the rule for the enterprise. However, where an enterprise is identified as being large and complex, the enterprise is split into homogeneous parts, called reporting units. These equate, as far as possible, to the concept of the kind of activity unit. Each of these is then treated as an analytical unit for survey purposes. In the example above, four homogeneous reporting units would be created, if the activity of each is large.

Where a set of reporting units is created to provide a split of the enterprise, it is still possible that one or more reporting units are not homogenous in respect of activity. In the first instance, the dominance rule is applied but where there is more information on the activity of the reporting unit itself the classification may be modified both at the reporting unit and for its constituent local units to better reflect its primary activity.

### **Why might enterprise-level industrial classification change?**

The methodology used to allocate SIC codes to enterprises could result in actual levels of manufacturing in the UK being understated in any analysis of enterprises. While ONS surveys use the reporting unit concept, this is not reflected in survey outputs. The profile of this issue is raised when looking at information published by businesses traditionally regarded as manufacturing. For example, the Rolls-Royce website states that 'Rolls-Royce is a technology leader, employing 38 thousand people in offices, manufacturing and service facilities in 50 countries...annual sales total £7.4 billion, **of which 53 per cent are services revenues**. Under the Statistics of Trade Act 1947, the classification of enterprises by ONS is confidential. However, such statements combined with a lack of awareness about how complex enterprises are actually coded to SIC gives rise to the concern that a classification based on a description provided by the company would not necessarily be the same as the classification produced by ONS based upon a classification of local units.

Concern over the under-representation of manufacturing within the UK has also been raised in the context of the growth of atypical forms of employment, in particular the utilisation of agency workers who may not be directly employed by the manufacturing enterprise. A recent article in the Guardian presented several examples of the utilisation of agency workers in manufacturing<sup>2</sup>. It reports that of the 4,700 workers at the BMW Cowley plant in Oxford, 1,200 are agency workers and that of the 23,500 workers employed by Corus steel, between 5 and 10 thousand agency workers are employed across the company.

The utilisation of agency workers may affect the balance of employment within local units of manufacturing enterprises and, in turn, the overall classification of enterprise. The reduction in manufacturing employment on the firm's books may in some cases lead to a change in classification. Moreover, the transfer of employment from manufacturing into services will directly alter the balance between the two sectors, even though the nature of the employment being transferred has not changed. Similarly, change could be influenced by outsourcing of certain activities abroad. A manufacturing firm might outsource some or all of its production to China, for example, while remaining in the retail business in the UK. Once again, manufacturing employment falls relative to service employment which may result in change in classification.

These developments have taken place against a background of technological change that has led to significant changes in the nature of particular jobs within industries and a restructuring of the way in which work is organised. The wider application of information technology has been of particular importance. The application of IT has led to the displacement of many clerical and secretarial jobs previously concerned with information processing using paper technology. The application of IT in manufacturing has also led to the displacement of many skilled workers whose jobs have been taken over by computer controlled machinery. On the other hand, information technology has opened up many new areas in which information services can be provided that were previously not feasible. This has tended to create jobs of a professional, associate professional and managerial nature. Investment in labour saving capital equipment could alter the balance of employment between local units.

Finally, changes in classification at the level of the enterprise could be due to changes to SIC classification of one or more local units. This will alter the allocation of employment to different SIC categories within the enterprise, and may lead to a change in the dominant SIC. Marginal changes in employment in mixed enterprises with a relatively even share of employment across local units could also lead to a change in the derived enterprise level classification. Lastly, changes in industry classification at the enterprise level could be due to restructuring or other demographic events at the local unit level. An enterprise may open a new local unit or close a local unit which shifts the balance of employment and leads to a change in the dominant SIC. Or one enterprise might take over another with the resultant balance of local units leading to a change in classification.

### **Identifying those Employed in Secondary Areas of Business Activity**

The above discussions have highlighted how levels of activity within particular business areas may be disguised if those areas represent secondary activities. Taking a longitudinal perspective, changes that occur either within or between local units could also affect the overall assignment of an enterprise. Such changes may occur due to the use of agency workers, off-shoring, technological changes,

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<sup>2</sup> *Underpaid, easy to sack: UK's second class workforce* Felicity Lawrence, 24<sup>th</sup> September 2007.

demographic events or other factors that could affect the balance of employment between local units or the classification of individual local units.

To investigate the potential importance of these issues, we utilise data from the Business Structure Database (BSD) is used. The BSD is a longitudinal business database constructed from annual snapshots of the Inter-Departmental Business Register (IDBR). The IDBR is a live register which acts as a sampling frame for UK business statistics. At the time of writing, BSD data was available for the period 1997-2006. For each enterprise, ONS maintains a list of "local units" through its Business Register Survey. The BSD is divided into enterprise files and local unit files. The local unit files can be linked to the enterprise files by means of corresponding enterprise reference number that is included for each local unit.

Enterprises from the 2006 BSD have been classified into three broad sectors: manufacturing (SIC 15 – 37), services (SIC 50 – 99) and other non-service (SIC 01 – 14 and 40 – 45). Each of the three sectors has been sub-divided into three categories: (i) enterprises with a single local unit, (ii) enterprises with multiple local units all of which are within the same sector, and (iii) enterprises with multiple local units which belong to different sectors. Table 3 summarises the data for the 2006, showing the number of enterprises and total employment in the three sectors and how these are distributed among the three sub-categories. There is clearly more employment in the service-mixed category (4.2 million) than in the manufacturing-mixed category (1.1 million), but this in itself reveals little about the size of manufacturing employment in the service sector and vice versa. Exploring these issues in more detail requires the use of the local unit BSD which makes it possible to calculate, for each enterprise, the total local unit employment in each of the three sectors.

**Table 3: Single and Multiple Site Enterprises within the BSD**

<b>2006</b>	<b>Enterprise</b>	<b>Employment</b>
<b>Manufacturing</b>	159,223	3,324,577
Single site	95.3%	47.6%
Multiple - exclusive	2.8%	18.5%
Multiple - mixed	1.9%	33.9%
<b>Other non-service</b>	393,864	1,915,912
Single site	99.2%	70.3%
Multiple - exclusive	0.5%	8.6%
Multiple - mixed	0.3%	21.2%
<b>Service</b>	1,694,077	22,773,434
Single site	97.0%	36.7%
Multiple - exclusive	2.8%	44.9%
Multiple - mixed	0.2%	18.5%

Table 4 shows for multiple site enterprises with mixed local units, the number of people who are employed within enterprises that have been allocated the same industry classification as the local unit in which they work. In total, 5.7 million people are employed in multiple site enterprises with mixed local units. Of these, 1.1 million are working in enterprises classified as manufacturing. However, examination of the

industry coding at the level of the local unit, indicates that 23 thousand are actually employed in Other Non-Services and 167 thousand are employed in local units within services. Manufacturing employment is therefore overstated by 190 thousand. However, offsetting this it is observed that many people who are employed in enterprises classified as either Other Non-Services or Services are actually employed in local units classified as manufacturing. In this respect, enterprise level classification understates the number of people employed in manufacturing by 99 thousand. Taking Table 4 suggests that manufacturing employment is overstated by about 91000, while other non-service employment is understated by about 43000, and service employment is understated by about 48000.

**Table 4: Comparing Enterprise and Local Unit Classification**

Enterprise Classification	Local Unit Classification			
	Manufacturing	Other non-service	Service	Total
Manufacturing	935,438	23,312	167,109	1,125,859
Other non-service	14,226	324,625	67,086	405,937
Service	84,817	101,282	4,019,873	4,205,972
Total	1,034,481	449,219	4,254,068	5,737,768

Table 5 shows the level of over/under representation of employment across sectors as identified by the method outlined above. It can be seen that for most of the period, manufacturing has been overstated based upon classification based upon the level of enterprise. While there appears to be a discontinuity in the series during 2003, it is generally the case that manufacturing employment is overstated by between 80 and 100 thousand. However, in the context of the 3.3 million people who are estimated to be employed in manufacturing based upon an enterprise level classification, this figure is insignificant. More generally, it is noted that in 2006, only around 1.4% of mixed enterprises are assigned to a sector which does not correspond to maximum local unit employment for that enterprise.

**Table 5: Under/Over Representation of Employment by Sector**

	1998	1999	2000	2001	2002	2003	2004	2005	2006
M	89,159	94,612	96,222	85,169	82,975	44,272	62,743	78,061	91,378
O	-113,852	-99,693	-111,618	-87,428	-93,256	-65,249	-77,871	-56,655	-43,282
S	24,693	5,081	15,396	2,259	10,281	20,977	15,128	-21,406	-48,096

### How Many Enterprises Change their Industrial Classification?

Approximately 18% of all enterprises, accounting for about 28% of employment, change their SIC classification at least once during the period 1998-2006, a period of 9 years. Of this, 2.3% (accounting for around 3.7% of total employment) are changes that result in a re-classification from one of the three broad sectors outlined above to another (e.g. manufacturing to service). The analysis in this and the next section will focus on changes in sector classification. From the perspective of understanding broad changes in the industrial composition of employment, such changes are interesting because they lead to the shift of the whole workforce/output of an enterprise from one sector to another.

Table 4 can be used to compare enterprises that remain within one sector for the entire time they appear in the BSD with those that change sectors. The first four columns show, respectively, the proportion of all enterprises and the proportion of total employment that can be found in a particular category. As noted above, a large majority of enterprises do not change their aggregate classification. Of those that do change, relative to the other categories of enterprises that change sectors, the change from manufacturing to services accounts for a largest proportion of people who are employed at enterprises that exhibit a change in classification. Enterprises in this category tend to be large in terms of their employment (column 5), but on average their employment shrinks significantly over the period they appear in the BSD (column 6), despite the fact that the local unit count remains stable on average (column 7).

**Table 4: Characteristics of Enterprises According to Classification Changes**

	Ent	Of those who change	Emp	Of those who change	Emp start	Emp change	LU change
<b>Manufacturing</b>							
Constantly in manufacturing	6.81%		12.77%		16.7	-0.5	0.01
Manufacturing to non-service	0.10%	4.3%	0.13%	3.7%	10	2.9	0.05
Manufacturing to service	0.49%	21.1%	1.02%	29.4%	22.5	-7	0.07
Manufact. to non-service to manufact.	0.01%	0.4%	0.03%	0.9%	21.4	15.5	0.48
Manufact. to service to manufact.	0.03%	1.3%	0.26%	7.5%	73	-6.6	0.4
Manufacturing to non-service to service	0.00%	0.0%	0.01%	0.3%	11.6	2.6	-0.04
<b>Other non-service</b>							
Constantly in non-service	15.49%		6.85%		3.6	0.6	0
Non-service to manufacturing	0.13%	5.6%	0.13%	3.7%	5.7	5.5	0.06
Non-service to service	0.47%	20.3%	0.44%	12.7%	8.1	0.9	0.05
Non-service to manufact. to non-service	0.01%	0.4%	0.02%	0.6%	19.9	4.2	0
Non-service to service to non-manufact.	0.03%	1.3%	0.08%	2.3%	21.7	2.8	-0.03
<b>Service</b>							
Constantly in service	75.39%		76.90%		8.2	1.7	0.03
Service to manufacturing	0.52%	22.4%	0.71%	20.5%	8.3	7.8	0.08
Service to non-service	0.42%	18.1%	0.36%	10.4%	5.6	3.7	0.06
Service to manufacturing to service	0.05%	2.2%	0.17%	4.9%	20.7	14.2	0.14
Service to non-service to service	0.05%	2.2%	0.10%	2.9%	15.5	11.3	0.07
Service to non-service to manufacturing	0.01%	0.4%	0.01%	0.3%	16	13.8	0.3

### Concluding Comments

The use only of the single dominant SIC code at the level of the enterprise within mixed enterprises will mean that economic activity in non-dominant areas of employment will be disguised. A number of structural changes within the economy have raised concerns that manufacturing employment and output may be understated. Analysis of the BSD has revealed that this is not the case. However, it is revealed that among those enterprises that have changed their industrial classification, these are more likely to be larger manufacturing enterprises that have experienced a reduction in their employment levels.