

## **Title: Implementation of NACE Rev. 2 in the Labour Cost Index**

Categorisation  
Personal Work Areas for the Business  
Management and Secretariat\Ole Black

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Status: **Default**

### **1 Introduction**

1.1 A 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 framework for the collection, tabulation, presentation and analysis of data and its use promotes uniformity. In addition, it can be used for administrative purposes and by non-government bodies as a convenient way of classifying industrial activities into a common structure.

1.2 This paper explains the background behind the revision to the industrial classification, discusses in general the work needed to be undertaken to move surveys and series to the new basis and finally focuses on specific issues on the Labour Cost Index (LCI).

### **2 Background**

#### *2.1 History*

2.1.1 Since 1948, the classification has been revised in 1958, 1968, 1980, 1992, 1997 and 2003. Revision is necessary because, over a period of time, new products and new industries emerge and shifts of emphasis occur in existing industries. It is not always possible for the system to accommodate such developments and after a period of time updating the classification is the most sensible action. The 1997 changes were not a full-scale revision but a response to users' demands for some additional subclasses together with some minor renumbering. Similarly, the 2003 publication represented a further minor revision of SIC(92) reflecting contemporaneous changes in NACE Rev 1 (see next paragraph) and meeting UK users' demands for additional detail at the subclass level.

2.1.2 The need for change equally affects all international classifications and they are revised from time to time to bring them up to date. On 9 October 1990 the European Council of Ministers passed a regulation to introduce a new statistical classification of economic activities in the European Communities (NACE Rev 1). In January 2003, a minor revision of NACE Rev 1, NACE Rev 1.1, was published.

#### *2.2 International classifications*

2.2.1 From the outset, the UK SIC followed the same broad principles as the relevant international systems. The first International Standard Industrial Classification (ISIC) of All Economic Activities was issued by the United Nations in 1948 and revised in 1958, 1968, 1989 and 2003. Nevertheless, there were differences in detail between the two as ISIC reflected the structure of economic activity in the world as a whole rather than that in one particular country.

2.2.2 In 1980, one of the principal objectives of the revision of the SIC was to examine and eliminate differences from the activity classification issued by EUROSTAT and entitled *Nomenclature générale des activités économiques dans les Communautés européennes*, usually abbreviated to NACE. This 1970 NACE could be rearranged to agree with ISIC at aggregated levels but departed from it in the details. The 1980 revision of the SIC applied NACE as closely as was practicable to the structure of British industry. In 1990, however, the first revision of NACE was made by EC regulation and this presented a different set of circumstances.

### 2.3 *EC Regulation*

2.3.1 A European Community regulation is directly applicable in all member states. The NACE regulation, therefore, made it obligatory on the UK to introduce a new Standard Industrial Classification, SIC(92), based on NACE Rev 1, and to use it where the UK is required to transmit to the European Commission statistics on economic activity. The NACE regulation gives effect to the wish of EUROSTAT to establish a common statistical classification of economic activities in order to promote comparability between national and Community classifications and, therefore, between national and community statistics.

2.3.2 The regulation applies to the use of NACE for statistical purposes only, although a country can also use NACE for administrative purposes. The regulation does not oblige Member States to collect, publish or supply data. NACE is only a language and all requests for data collection, transmission and publication must be specified elsewhere. A new version of NACE, Rev 1.1, came into effect in January 2003. As already indicated, NACE was originally an acronym but now all countries use 'NACE' to describe the European Community classification of Economic Activities.

2.3.3 The existing NACE regulation will be superseded by a new Regulation which will set down NACE Rev 2. As well as outlining the content of the new classification the new Regulation will include, as a series of annexes, amendments to the other regulations which require results to be provided by industry. These include the two key business statistics regulations, the Structural Business Statistics (SBS) Regulation and the Short Term Statistics (STS) Regulation, along with others such as those on Structural Earnings and Labour Costs.

### 2.4 *Structure of SIC(2007)*

2.4.1 SIC(2007) is based exactly on NACE Rev 2 down to the four digit (class) level. A fifth digit will be added, where it is considered necessary or helpful, to form subclasses of the NACE Rev 2 four digit classes. Thus, SIC(2007) is a hierarchical

five digit system. The following table illustrates the differences between the latest version of SIC(2007) and SIC(2003), bearing in mind that the NACE Rev 2 is not finalised yet.

Table 1: Number of categories at each level of detail for SIC(2003) and SIC(2007)

Level of detail	SIC(2003)	SIC(2007)
Section (single letter)	17	21
Division (two digits)	62	88
Class (four digits)	517	619

2.4.2 There are more groupings in the new classification. The main reason for this is a greater level of breakdown in the services industries in the new classification, helping to redress some of the imbalance in manufacturing and services in SIC(2003). In the new classification, the number of manufacturing divisions has increased by one, construction has increased by two, water supply, sewage and waste management by three and the rest come from services.

2.4.3 New sections have been created for: information and communications; professional; scientific and technical services; administration and support services; arts and entertainment and recreation.

## 2.5 Timetable

<b>Draft Implementation Plan for NACE Rev. 2</b>	
1st January 2008	Statistical Units in Business Registers shall be classified according to NACE Rev. 2.
1st January 2008	Economic activities performed from this date onward shall be classified according to NACE Rev. 2.  2008 will be the first reference year for all community statistics in accordance to NACE Rev. 2, with the exclusion of STS, LCI.
1st January 2009	Starting of the reference period for the production of STS and LCI indices produced according to NACE Rev. 2. Member States will provide also back-cast series.
October 2009	Preliminary SBS data referring to 2008 will be sent to EUROSTAT according to both NACE Rev. 2 and NACE Rev. 1.1.
June 2010	Definitive SBS data referring to 2008 will be sent to EUROSTAT according to: NACE Rev. 2 NACE Rev. 1.1
2011	Implementation of NACE Rev. 2 in National Accounts

2.5.1 The table above provides the outline timetable for the provision of statistics and information to EUROSTAT under NACE Rev 2. The register needs to be in place in 2008 to allow statistics to be collected and published in NACE Rev 2 for that reference year. However, with the extra demands on back series for short term statistics and the labour cost index, those indicators do not need to provide information until the reference year 2009. Although this gives more breathing space, the timetable is very tight since the creation of back series is labour intensive. Moreover many short term indicators are composite and will require other indicators on the new basis before they can be constructed. For example the production index in the UK uses deflated sales so it needs prices in NACE Rev 2 before it can be assembled.

## 2.6 Challenges faced by NSIs

2.6.1 Unlike the change to NACE Rev 1.1 in 2003, the revision to NACE Rev 2 is a major change, the first for over a decade. This will need careful planning as both short economic statistics and structural indicators must be produced to the normal timetables within resources. This represents extra development work which must be undertaken that will need significant extra funding and professional resource. In the UK the total cost for implementation is currently estimated at 30 million EUROS.

2.6.2 One of the big difficulties in the work of implementation is in remembering how the exercise was carried out last time. There are few staff who were involved in the introduction of NACE Rev 2 still in statistical work in NSIs. Moreover, their memories of how the work was undertaken are often vague and records are difficult to locate or have been destroyed. Even if we were able to track the full details of how things were done last time, it must be recognised that a lot has changed. For example when NACE Rev 1 was introduced, services statistics were still being developed and register coverage of the services sector was poor and for some Member States non-existent. Thus the previous exercise focused principally on manufacturing.

2.6.3 Over the last decade, gentleman's agreements for the provision of statistics to EUROSTAT have generally been superseded by regulations which have improved timeliness and given greater consistency and coherence. The European Central Bank have influenced the development of short term statistics with the need to set interest rates. The importance of European measures necessitates that the conversion to NACE Rev 2 is carried out at the same time by Member States. Thus there can be no derogations in the time of the change over nor in the provision of back series.

2.6.4 For the Labour Cost Index which is relatively new, this is the first time that a change to the classification has been implemented. This work is, therefore, new for all Member States. Hence it is even more important that this group produces guidelines and assistance for Member States which not only provide help but also enable a consistent approach to be taken.

## 2.7 EUROSTAT Approach

2.7.1 EUROSTAT recognises that this is a major task for National Statistics

Institutes and one for which they will need help and guidance. Although financial assistance is unlikely to be available for most countries, substantial work is underway on planning and preparing guidance notes using experts from Member States.

2.7.2 EUROSTAT assembled a task force to prepare the composition of NACE Rev 2. This has now evolved into an implementation task force with experts from France, Germany, Spain, Austria, Hungary and the UK. In addition to planning activities, the group is putting together a handbook "Setting up an Implementation Plan for NACE Rev 2 in National Statistical Institutes".

2.7.3 Whilst this group will provide general information, there will be specific issues around indicators which need to be addressed by the experts in those statistics. Thus whilst some guidance is available the task force's remit to consider the transition of the LCI to NACE Rev 2 is vital if this aim is to be achieved to timetable by all Member States.

### **3 Methodological Challenges**

#### **3.1 Sampling**

3.1.1 All business surveys are currently selected from the register according to NACE Rev 1.1. It will be necessary to redesign these surveys to be able to be selected according to NACE Rev 2.

There are two major areas that this process needs to address:

- i. Resource/ timing issues
- ii. Methodological issues

3.1.2 All business surveys are currently selected from the Business Register according to NACE Rev 1.1. The big issue to resolve is one of timing - when to select according to the new classification? The UK expects to implement NACE Rev 2 on the register in January 2008, but would not wish to select businesses for short term surveys according to the NACE Rev 2 from the start of 2008. ONS would be reluctant to do this partly because the quality of the information is likely to be poorer in the early days of its implementation. It is desirable to allow the register to settle down a little in terms of NACE Rev 2. Moreover, the significant changes in extending the detail in the services sector necessitate the re-design of samples which will need considerable methodological and business area resource. Clearly, this needs to be taken into account in planning. Indeed European plans now require the provision of Short Term Statistics from the start of 2009.

3.1.3 The redesign of samples under a new classification is resource intensive, and it may be impractical to reallocate all samples adequately in the time allowed between new NACE Rev 2 becoming available and the need to select samples. In this case, alternative proxies may need to be sought to transition between the SICs. One option that may be possible is for the existing sample to be tabulated against the new strata, and using the number in each stratum as the new sample size. Of course this won't lead to an optimal solution, but the allocation procedure is such that reasonably large deviations can be made from optimality with only a small impact on

the quality of estimates produced. Some checking will need to be done to identify cells with no sample or very small samples under this process.

3.1.4 Most of ONS's business surveys operate with stratified simple random samples. Stratification is usually by a fairly fine level of NACE Rev 1.1 detail and between four and six sizebands based on employment values held on the register. Allocation of the total sample size to strata is usually done by the Neyman Optimal Allocation method (Neyman 1934) where the sample size,  $n_h$ , in stratum  $h$  is:

$$n_h = n \frac{N_h S_h}{\sum_{h=1}^L N_h S_h}$$

where  $L$  is the number of strata in the population,  $N_h$  is the number of elements in stratum  $h$  in the population and  $S_h^2$  is the variance of elements in stratum  $h$  in the population according to the estimation model chosen for the survey.

3.1.5 Given that each business in the population will be reclassified to NACE Rev 2 and will therefore have a new code, we can determine the population size in each of the new strata. Since  $S_h^2$  relates to the value in the population at large, we usually estimate this by  $s_h^2$ , the variance of elements in stratum  $h$  in the sample.

3.1.6 However, under newly-defined strata, we may not have these for some strata, so alternative approaches will need to be examined. One option is to produce these estimates from the relevant businesses making up each new stratum, according to the weight each business had in the original survey. In practice however, we find that values of  $s_h^2$  are often too variable between strata to use them directly, so it is necessary to use an average of previous sample variances, or to model stratum-level estimates of variance against Business Register counts such as stratum size and the totals of employment and turnover. Such a modelled approach would likely work well in the situation where we have reconstituted strata since new 'variances' can be produced according to the characteristics of any of stratum, however designed. Other alternatives such as x-optimal allocation (Sarndal et al 1992) could also be considered on a similar basis.

3.1.7 If the optimal sample allocation design work is delayed, it will be possible to calculate the required estimates of variance and obtain the Neyman allocation. However, a delay beyond the start of 2009 is not recommended. Such an approach would require double coding of the register. This either needs to be done in full which is resource intensive, or else needs to be carried forward via correlation matrices which means that the quality of the old classification will deteriorate over time.

## 3.2 Weighting

3.2.1 We have identified three options for applying calibration weighting in the context of the classification change. First, we first outline some basic assumptions as follows.

- There will be a year during which the frame will be classified to both systems at

the unit level - assume this is year 1 (changeover year). Note that as sample selection will be based on a design incorporating only one of these systems (probably the former classification) then the design weights (a-weights) will be fixed by this design.

- There will be a requirement for aggregates to be produced on both old and new classifications for all years prior to the change year. This is described in the following section on back series.
- That during year 1 that selection is based on the old classification system and that for following years on the new system.
- There will be a requirement for aggregates to be produced on both old and new classifications during the changeover year.
- There will be a requirement for aggregates to be produced only on the new classifications after the change year. However this may need to be reconsidered in the light of the later move of National Accounts to the new classification.

3.2.2 We now outline the three options. Note that in each case, the calibration approach results in a single weight (the product of a and g) for each business, so aggregates, for whatever domain, are simply the products of the weight and the survey variable, summed over all relevant businesses in the domain.

#### *Option 1*

##### *Year 1*

- Calculate calibration factors (g-weights) using the old classification.
- Produce results using conventional estimation for the old classification and by domain estimation for the new classification.

##### *Year > 1*

- Calculate calibration factors (g-weights) using the new classification.
- Produce results using conventional estimation for the new classification..

##### *Pros*

- Completely consistent with the old series (years earlier than 1- i.e. no discontinuity in the time series going backwards)
- Gives the new classification on the Business Register time (a year) to settle down
- Totals for equivalent classifications (those that haven't changed between NACE Rev 1.1 and NACE Rev 2) will be the same.
- Weighting is consistent with design (selection).

##### *Cons*

- There may be a discontinuity in the year following the change; this depends on the size of the difference between the classification systems.

#### *Option 2*

##### *Year 1+*

- Calculate calibration factors (g-weights) using the new classification.
- Produce results using conventional estimation for the new classification and by domain estimation for the old classification.
- Variances for the old classification domains would need to be calculated differently (domain estimates) to those under the new system.

### *Pros*

- Completely consistent with the new series (no discontinuity in the time series going forwards)
- Any discontinuity taken as one hit in the changeover year.
- Weighting for subsequent years is the same as for year 1.
- Again totals for equivalent classifications (those that haven't changed between NACE Rev 1.1 and NACE Rev 2) will be the same.

### *Cons*

- The new classification on the Business Register may not have settled down so there may be issues with outliers or other unusual results during year 1.
- Weighting is not consistent with design (selection) in year 1.

### *Option 3*

#### *Year 1*

- Calculate calibration factors (g-weights) using both classification systems. In this case the population totals are reproduced by summing the weighted employment (turnover) for both classifications.
- Note that the variances for both classifications would need to be calculated using Statistics Canada's Generalized Estimation System (GES) (Estevao et al 1995).

#### *Year > 1*

- Calculate calibration factors (g-weights) using the new classification only.
- Produce results using conventional estimation.

### *Pros*

- Discontinuity should be minimised in both years since the calibration totals are reproduced under both classification systems in year 1. This is conditional on there being some correlation between the output variables and the chosen auxiliary.
- Gives the new classification on the Business Register time (a year) to settle down
- Totals for equivalent classifications (those that haven't changed between NACE Rev 1.1 and NACE Rev 2) will be the same.
- Weighting is consistent with design (selection).

### *Cons*

- If the classifications are radically different there may be a problem with extreme weights in year 1. (For example if there happens to be a very small sample in one of the new classifications in year 1 since selection was carried out using the old classification).

3.2.3 All three options are can be sensibly applied during a classification change and have been listed in increasing order of risk and benefit.

3.2.4 For option 1 the main disadvantage is that discontinuity will arise in the year following the classification change, whereas it may be considered more sensible to have the discontinuity coincide with the strict date of the changeover. The main advantage to option 1 is that the maximum time is allowed for the new classification to settle down before it is used for weighting.

3.2.5 Option 2 moves the discontinuity a year earlier so that there should be

consistency between years 1 and 2; the discontinuity therefore takes place during the same period that the classification is changed. There is some risk here due to using the new classification on the Business Register a year earlier than in option 1.

3.2.6 The main risk with option 3 is that some unexpected weights are produced in year 1. This is especially true for variables that are not correlated (or negatively correlated) with the auxiliary variable (employment or turnover).

### 3.3 Back series

3.3.1 A consistent back series is important for many users. There are clear difficulties with producing such a back series since it is impossible to be completely sure of the classification of any business at any point in history. Therefore, we need to ask what is practicable within the constraints of data and systems/resources availability. Two main options are considered.

3.3.2 First, if the NACE Rev 1.1 codes are known for individual businesses, new codes can be assigned at the individual level according to the following criteria:

- for as far back as the business has the same classification, we can assume that the current NACE Rev 2 would be appropriate and use this value;
- for other situations, individual NACE Rev 2 codes can be imputed according to a look-up table.

3.3.3 Then, once each record on the historical dataset has a NACE Rev 2 code, domain estimates can be produced as required. This method is very resource intensive particularly for long back series so alternatives need to be considered. It involves running results for each period separately. Not only does this entail substantial computer input it is also necessary to examine each period's results. For example new decisions on outliers need to be taken. Difficulties may also arise in weighting if some cells are empty or contain small numbers in the sample. Thus the process is far from automatic and will take up substantial resource. For a monthly or quarterly survey it is unlikely to be viable over a long time span. It would bring benefit if applied over a link period - a quarter or a year and could possibly be extended to 2-3 years should resource be available. The further back in history one goes the weaker the assumptions will be regarding the new classification. This further argues against applying this method to a long term time series.

3.3.4 A second, simpler, alternative is to use correlation matrices that record the relationship between the new industries and the old. Then, estimates can be produced on the new basis by taking old estimates and multiplying them by the appropriate conversion factors.

3.3.5 Both methods rely on assumptions that the current relationship between the old and new classifications is appropriate to apply to old data. Clearly, the further back in time series are converted, the more quality issues will be associated with that. However, both provide a reasonable way of producing back series to meet users' needs.

3.3.6 The first method was recently applied in the UK for the Annual Survey of

Hours and Earnings when the Standard Occupational Classification (SOC) changed from its 1990 revision to a 2000 revision. For records in the same job between years  $t$  and  $t-1$  the SOC00 code from year  $t$  was carried back to year  $t-1$ . In addition for any records with the same SOC90 code in years  $t$  and  $t-1$  the SOC00 code from year  $t$  was carried back to year  $t-1$ . The remaining codes were imputed according to the frequencies derived from the 2002 dataset, which was coded according to both classifications.

3.3.7 Good quality back series will depend on good quality measures of the correlation between the two systems. The use of the register to code businesses on both levels means that Business Register data may be used for this purpose. Such a correlation matrix can also be formed based on the number of businesses, their employment or their turnover. Structural Business Statistics provide a further source of possible correlation information, although the sample here is much smaller than that from the register. They also allow a greater range of correlators (for example capital expenditure).

## **4 Labour Cost Index**

### **4.1 Background**

4.1.1 The Labour Cost Index is a short term indicator which measures changes in the cost of labour per hour worked. This reflects changes in wages and salaries, non wage costs and the quantity of hours worked over time and assists users in monitoring inflationary pressures emanating from the labour market. It is a relatively new index, being still an experimental series in the UK which was formally introduced in 2005. Although publication is at high level of classification (generally section level of the SIC), the calculation of the index in the UK is undertaken at the divisional level of the SIC. The introduction of NACE Rev 2 will be the first major change that will have affected this new indicator. It is, therefore, important that guidance is given to statisticians in National Statistics Institutes so that a coherent approach can be adopted and that they receive the help which they need.

4.1.2 Although general survey issues were discussed in the last chapter, the LCI has some specific characteristics that need to be considered:

- a. Measurement of non wage costs
- b. Measurement of hours worked
- c. Construction of back series of a hybrid indicator

### **4.2 Measurement of Non Wage Costs**

4.2.1 Wages and salaries are estimated from returns to a survey to businesses. However, non wage costs are derived from a mixture of other surveys and administrative data. Although in the UK wages and salaries comprise around five sixths of total labour costs, it will be necessary to ensure that non wage costs can be provided on a NACE Rev 2 basis when needed and that information is available to calculate back series. This is particularly challenging for administrative sources over which statistical offices have little control and for which the cost of change (particularly to computer systems and for recoding) can be substantial. Moreover

such organisations have little to gain in this extra work as classification is of little interest to them. The UK uses the following main sources:

4.2.2 The estimate for sickness, paternity and maternity payments is produced using the results from the Labour Force Survey (LFS). This survey measures the number of hours an employee usually works, the number of hours actually worked and the reason why the two measures are different. The differences between usual and actual hours that have been attributed to sickness, paternity and maternity can be calculated to estimate the cost of these elements to an employer. This information will be required from the LFS. The LFS will need to be on the new basis for 2009 and also be able to provide information on 2008 to allow back series to be calculated. These proportions are seasonal (for example sickness tends to be higher in winter months). Thus the derivation of back series is best carried out when all four quarters of the LFS for 2008 are available. However, this makes implementation in Q1 2009 virtually impossible.

4.2.3 The measure of costs of benefits in kind is derived using combined estimates from the Inland Revenue's Survey of Personal Incomes and the ONS Annual Survey of Hours and Earnings. The approach allows ONS to produce an estimate of the average proportion of costs of benefits in kind each year, within each relevant industry, and the proportion is applied for four consecutive quarters. Whilst the use of ONS' Annual Survey of Hours and Earnings is unlikely to be a hurdle as this could move to NACE Rev 2 in 2008, the survey of personal measures is run by the UK's tax department. It will be necessary to persuade them to move at the appropriate time or alternatively use correlation matrices in their survey.

4.2.4 Using data obtained in the ONS Annual Survey of Hours and Earnings, allows the derivation of a precise estimate of employers' national insurance contributions by applying published rates (for each year), to individual employee data. This estimate uses not only the gross pay for the employee, but also the pension arrangements the employee has made, which means adjustments for rebates can accurately be calculated. This is aggregated to industry level and compared to the gross wages and salaries from the survey to create National Insurance Contribution factors. This is not anticipated to be a difficulty as it will be possible to move ONS' survey of Annual Hours and Earnings to NACE Rev in 2008. However, it will entail significant extra effort.

4.2.5 The issue of employers' pension contribution costs is complex, since this depends on the employers' and employees' occupational pension arrangements. The data used to provide information on this aspect for the Index of Labour Costs per Hour were obtained from the ONS Annual Business Inquiry, which is an annual survey of businesses which also captures data on employer pension contributions.

The Annual Structured Survey will move to the NACE Rev 2 for the 2008 reference year with preliminary results available in the autumn of 2009. It may be possible to rerun the 2007 structural survey on NACE Rev 2 but results would not be available until spring 2009. This would be too late for an LCI which needed to be on NACE Rev 2 by the start of 2009.

### 4.3 Measurement of Hours Worked

4.3.1 The new index responds to demands for a 'per hour' earnings indicator by using an estimate of total hours worked. The move from a 'per job' index to the 'per hour' Index of Labour Costs per Hour means the indicator is more sensitive to changes in the labour market. It relates to employees only (i.e. excludes the self-employed), and total hours worked include those worked and paid at both ordinary time and at premium rate, together with those worked for no payment (typically unpaid overtime). The total excludes time not worked because of sickness, annual leave, statutory holidays, special leave, meal breaks and because of short-time working. Some of these components will be paid while others will not. An ONS business pilot survey has shown that, generally, businesses are unable to provide information on total hours worked. Given this, it has been necessary to develop a methodology to estimate hours using alternative, existing sources. The denominator of the Index of Labour Costs per Hour therefore estimates total hours worked by using estimates of average total hours worked in first and second jobs by employees, as measured by the Labour Force Survey, together with estimates of total employment produced using data from the Monthly Wages and Salaries Survey (MWSS).

4.3.2 To calculate the denominator of the LCI, information is needed from the LFS of the average number of hours worked by division. Thus in order to move to NACE Rev 2 the LFS needs to provide this information. In the UK's case this needs to be at divisional level.

4.3.3 For the LFS the change of SIC is likely to be simpler than for a business survey. The LFS is a household survey so industrial classification is not a determinant of the sampling nor of the weighting. It is instead a variable that is used in tabulation. In order to produce results on the new classification, the key is that individuals jobs are classified to that classification and are dually coded over an appropriate period. As hours worked is a seasonal variable it would be beneficial if there were to be dual coding for 2008 with a move to the new classification for 2009. This would allow 2008 to be a link year and help in the derivation of back series. However, timing for the LCI may be tight if it is to move formally at the start of 2009 with UK back series calculated. In most countries discussions on the reclassification of the LFS to NACE Rev 2 are not well advanced. It is important that the plans are made soon.

#### 4.4 Derivation of Back Series

4.4.1 The LCI is a hybrid indicator. It comprises:

Wages and Salaries  
Non Wage Costs  
Hours

Moreover information needs to be provided for a number of separate categories:

- Average total labour costs per hour worked
- Average wages and salaries per hour worked
- Average other labour costs per hour worked

- Average total labour costs excluding bonuses and arrears per hour worked

4.4.2 Each of these could be derived separately. For consistency a better plan might be to derive separate series for:

Wages and salaries  
Non wage labour costs  
Total labour costs excluding wage bonuses and arrears  
Hours worked  
Weights

Total labour costs would be derived by adding the first two. The hours information would be consistent across all measures. The following sections briefly describe how each of these variables may be derived.

4.4.3 Wages and salaries: Estimates for total wages and salaries could be produced on both old and new NACE for 2008. This parallel period could then be used to produce total wages and salaries estimates on the new NACE back to the start of the series. This process could also be used to derive estimates for bonuses and arrears which would be used in producing the series excluding bonuses and arrears.

4.4.4 Non-wage labour costs: Separate estimates could be produced for non-wage labour costs. In the UK, non-wage costs are estimated as proportions of wages and salaries. These proportions could be produced on old and new NACE for 2008 with this information used to estimate factors back to the start of the series. The estimated factors would then be applied to the back series for wages and salaries to give a back series for non-wage labour costs.

4.4.5 Hours worked: Hours worked could be derived on both the new and old NACE for 2008. In the UK the hours worked series is produced using average hours worked per employee and multiplying this by the total employment figure produced by the wages and salaries calculation. The information from the parallel period in 2008 could be used to estimate average hours figures back to the start of the series which would then be applied to the employment back series.

4.4.6 Weights: Industry weights will need to be calculated on old and new NACE. In the UK, weights come from the business register and will be available on old and new SIC for a parallel period of at least 12 months. Weights for earlier years could be calculated by applying the employment correlator to the previous NACE Rev 1.1 employment weights.

4.4.7 Calculating the LCI back series: Once the component parts of the LCI are available as defined in 4.4.3 to 4.4.6, they can then be used to calculate a back series to 2000 Q1.

Last Modified : 19/01/2006 15:26:25