Producing historical time series for NACE Rev.2 for Business Surveys

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1. Introduction
An important part of the implementation of NACE Rev 2 in the area of Short-term Statistics and Business Surveys is the conversion of the current historical time series form NACE Rev 1.1 to NACE Rev 2. Such a conversion is necessary to avoid loss of data and to have long enough series to perform seasonal adjustment.

This chapter starts with a discussion of the basic principles of reconstructing time series in general, after which the application of these methods in the area of Short-term Statistics and Business Surveys is handled. Finally, the results of the survey conducted by the DG ECFIN Task Force on NACE Rev.2 in Business Surveys will be summarised, showing the current plans on backcasting by the institutes producing these surveys.

Main conclusions
Historical time series for Short-term Statistics and Business Surveys may be produced by recalculation of recoded micro data as well as with backcasting methods that combine conversion tables with the “key approach”. In practice, it is also possible to recalculate series for recent years and backcast older periods in the time series.

2. Overview of the main methods
There are several possible procedures to apply a revised classification to historical time series. They can be divided into four main methods.
1. Use of a recoding key on published series
2. Recalculating data by recoding units at the micro level (“reconstructing”)
3. Converting or retrapolating published series using a conversion matrix (“backcasting”, “macro-approach”)
4. Combining the micro and macro approaches, e.g. by estimating benchmarks years with a micro method and interpolating with macro techniques or by backcasting transition matrices as an intermediate step

These approaches will be discussed briefly below, together with there usefulness for application on Short-term Statistics and Business Surveys. From this, two main approaches for Business Surveys will be presented and illustrated with examples.

2.1. Use of a key
The method based on the use of a key is the most straightforward and simple of the four methods described in this report. The technique use a recoding “key” with which a classification at the lowest aggregation level is directly recoded to the revised classification E.g. the old code 4.3.2.1 is recoded to 1.2.3.4 and the historical data for 4.3.2.1. are assigned to 1.2.3.4. In its purest form, this method can only be applied if there are only 1-on-1 or n-on-1 changes from the old to the new classification. The relationship between NACE Rev 1.1 and Rev. 2 is more complicated than that, but for a large number of series this condition is met. Especially in the area of Industry, Construction and Retail Trade there are possibilities to apply this method at least partly.
The key method assures a straightforward relationship between the old and the new results, since the old data are simply transferred or projected onto the new classification. Changes in the outcomes are transparent and can easily be documented and communicated with users.

2.2. Micro-approach
The micro-approach means that the revised classification will be applied to the historical time series by assigning the revised classification to each statistical unit and for every period in the time series. That is, all statistical units used for calculating the old time series are coded again according to the new classification. After that, the statistical results (averages, totals etc.) are recalculated using the same calculation routines as for the old data. In fact, the entire production process is repeated starting from the micro level, but now using the new classification. Therefore this technique is also known as the micro-approach.

The method is not dependent on the type of relationship between old and new codes and can also cope with for instance 1-on-n and n-on-m relations between the old and new classification. Because of the double coding of the units according to the old and new classification, there is an exact relationship between the old and new results.

In practice however, differences in the outcomes may be less transparent. In cases where outlier treatment, imputation for non response etcetera have an influence on the outcomes, the differences between the old and new results are not completely related to the recoding as such. In those cases, an aggregate group that has a 1-on-1 relationship between the old and new classification may show different totals or averages. Analysing, documenting and communicating changes in the outcomes between the old and new classification is in such case more complex.

Whether these problems actually arise, depends on the survey design and the type of variable.
In case of a census, these problems are smallest, since it is not necessary to use grossing up procedures or outlier treatment. In the case of sample surveys and panels however, grossing up and outlier treatment usually does have an effect on the outcomes and changes are not completely attributable to recoding. In all types of survey designs, differences may occur in cases where non-response is imputed using the average of the responding units in a specific NACE group.
If the calculated variable is a total (like turnover of production in the area of Short-term Statistics), problems are probably bigger than in case of e.g. averages (like confidence data or price indices). The averages are more robust, since upward and downward differences will more or less balance out.

This method requires for each unit information about which classification it would have had in terms of the revised classification code. At the moment of the implementation of NACE Rev. 2, this information is available. As part of the implementation, the business register has to be double coded, so for every unit at that moment both codes are available. For previous periods however, units did exist that are no longer in the business population at the implementation moment. These units have to be coded also to NACE Rev. 2. If the population is very stable, this can easily be done. If however the dynamics are large, this will be time and resource consuming. When e.g. only one percent of the companies in the panel disappears every year, this implies that after five years only five percent of the panel has got to be replaced. This means the other 95 percent of the panel only has to be recoded once (at the starting point) and just a small part of the population a couple of times.

One possible extension in this area is the development of automatic recoding procedures for units that ceased to exist before the moment of the NACE Rev.2 implementation. In the case of 1-on-n splits, the
percentage shares from the conversion matrix can be translated in percentage chances with which the new NACE codes can be assigned to the units. And of course, in the case of 1-on-1 conversions, the coding process simply assigns the NACE Rev.2 code from the correspondence tables.

In this respect, there is a very important difference between a census on the one hand and samples and panels on the other hand. In a census, all units are in the sample, so only the sample has to be recoded. In case of a panel or a sample, the dynamics in the other, non-observed units in the population has an influence on the outcomes. This holds especially if the variable is a total (like turnover) that has to be grossed up. The calculation of grossing up factors requires recoding of the entire population in a specific NACE code. On the other hand, if the variable is calculated as an average (like prices or confidence data), it may not be necessary to recode the entire population as long as it may be assumed that the observed sample or panel remains representative also for the new NACE group.

To sum up: the micro approach can deal with all types of relationships between old and new codes, but may produce differences in the results that are not completely attributable to the recategorization. With Business Surveys usually set up as panels used for the calculation of averages, this drawback is less important in their case than for e.g. turnover statistics. From an operational point of view, this method will be more costly and difficult for older years than for recent years.

### Backcasting and the level of detail

In general, backcasting time series for the NACE Rev.2 changeover is more difficult at lower aggregation levels than for the highest aggregates. Because the classification is above all expanded, many changes consist of splits of one old NACE code into several new codes. In general, many of these splits remain within the same branch, like Industry or Services. An analysis by Eurostat for the STS Short-term statistics shows that at the highest STS aggregates the new NACE groups are almost the same as the old ones. Retail trade under the NACE Rev.2 has exactly the same content as under NACE Rev.1.1. Industry and the STS aggregate “Other services” have approximately 95% the same content, Construction for about 85%.

On lower aggregation levels things are more complicated, but not always. A number of 3 and 4 digit NACE Rev.1.1 codes correspond with only one new code (1-on-1 correspondences). In this case the old data can easily be used for backcasting (using the “key method”). In a limited number of cases, several old codes correspond with one new code (n-on-1 transitions). Here also old data are easily usable for backcasting. More problematic are cases where one old group is split into several new ones (1-on-m splits) or where a number of old groups corresponds with a number of new groups (n-on-m transitions). In these cases, either micro or macro methods have to be applied for backcasting.

#### 2.3. Macro approach

Opposite to the micro approach, the macro approach works at aggregate levels. The data based on the initial classification are redistributed according to the revised classification with the help of a set of conversion coefficients. These conversion coefficients are derived from a conversion matrix. This means only one point in time is double coded according to the old and revised classification. Therefore the main advantage of this method is that it’s a relatively low resource and time consumption technique.
The use of conversion matrices enables this method to cope with all types of relationships between old and new groups. That means that also 1-on-n and n-on-m relationships can be handled. In the case of 1-on-1 changes, this method will act the same as the key method.

In this method, the relationship between the old and new results is strong. Since it re-assigns the old published data to the new classification groups, the grand totals do not change and at lower aggregation levels the differences are fully attributable to changes in the classification. Analysing, documenting and communicating differences is therefore relatively simple.

**Correspondence and conversion tables**

Although the terms correspondence tables and conversion tables may sound like synonyms, they actually refer to different things.

A correspondence table is a sorted list of NACE-codes that for each codes shows the corresponding NACE codes according to the other version of the NACE classification. This can also be represented by a cross table that is usually called a correspondence matrix. Such a matrix contains e.g. an ‘x’ or a ‘1’ in every cell that can logically contain a value according to the correspondence tables.

Conversion or transition tables can be made when the new classification is actually applied to a specific statistic in a country. These tables show which part of an old group corresponds to a new group, either measured in absolute values or as percentages. A cross table version of such a table is called a conversion or transition matrix.

**Figure 1: example of a conversion matrix**

<table>
<thead>
<tr>
<th>Conversion matrix branch X</th>
<th>NACE Rev. 2</th>
<th>Not in X in NACE Rev. 1.1</th>
<th>Total X in NACE Rev. 1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>NACE Rev. 1.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>93-1</td>
<td>08-1</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>08-2</td>
<td>70</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>08-3</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>08-4</td>
<td>13</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>08-5</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>08-6</td>
<td>20</td>
<td>60</td>
</tr>
</tbody>
</table>

In general, this kind of tables describes the transition from one version of the classification to another one. In their most basic form, they show the distribution of the number of units between the two classifications. For analytical purposes, they are usually also made with e.g. turnover or the number of employees. In order to explain to users what actually happens with the outcomes of a given statistic, transition matrices can be calculated also for the “target variables” of a statistic. In the case of confidence indicators, they may for instance show the percentage of “positive” answers for a certain question for every cell in the matrix.

Although conversion matrices only exist at the aggregated level, they can only be calculated from the micro level. Every statistical unit has to be double coded according to both version of the classification, after which a conversion table can be calculated by aggregating the macro data. In the case that old units themselves are split or merged (e.g. when all statistical units are actually derived all over again from the basic fiscal and trade register units) the basic entity for these calculations even has to be below the statistical units.

Conversion matrices can be used for backcasting purposes. In that case turnover, value added and numbers of employees are the most common variables used for the calculation of conversion factors. One should be aware of differences in structure between these variables, since the structure of the used variable determines the conversion matrix.

Several cases can be distinguished:
1. the conversion matrix is directly based on the statistical outcomes of the reference period. This is e.g. the case for Structural Business Statistics, that directly estimate the level of for instance turnover or production. The totals of the conversion matrix are the same as those published for the reference period.

2. the conversion matrix is based on the same variables as the “target variables”, but for a different period than the reference period. This is e.g. the case for Short-term statistics on turnover of persons employed, with the conversion matrix made for the base year of the index series and used to convert the weighting system from NACE Rev 1.1 to Rev. 2, thus producing a new conversion matrix with the weights. This is needed to aggregate the backcasted series at the lowest level of detail to higher aggregates.

3. the conversion matrix is based on a different variable as the “target variable” and on a different period. This is e.g. the case for the confidence indicators of Business Surveys and price indices in the STS area. A conversion matrix is used to convert the weighting system from NACE Rev 1.1 to Rev. 2, thus producing a new conversion matrix with the weights. Depending on the approach used, a third kind of conversion matrix may be calculated with the “target variables” for every cell, thus showing e.g. the average price or confidence level for every cell in the conversion matrix.

In cases 2 and 3 a separate conversion matrix will have to be calculated to describe the actual relationship between NACE Rev. 1.1 and Rev. 2 for the outcomes of the target variables in the reference period.

When applying a conversion matrix from one period also for other periods however, assumptions have to be made. Basically, one has to assume that a specific aspect of the structure from the conversion matrix remains constant over time. E.g. for turnover in the area of Short-term Statistics one may assume that for the entire time series, 60% of the value of the old group 4.3.2.1 is assigned to the new group 1.2.3.4. Translated to Business Surveys, one may assume that the balance between positive and negative answers in a new group is evenly distributed over all composing old groups. Or the other way around: that the balance in an old group is evenly distributed over all composing new groups. Of course, this kind of assumptions never holds exactly and usually becomes more disputable when the length of the series increases.

This issue is especially important in the case of 1-on-n and n-on-m relationships. If one old group is split up into two or more new groups, all of these new groups may get the same level or the same development over time as the old group, depending on the type of assumption. Therefore, this problem will be strongest in the area of services and smaller in industry, construction and retail trade.

One way to deal with this problem is to make use of experts’ opinion about a specific market. Based on that knowledge one could for example assume that a particular subclass is characterized by a certain exponential growth. For instance in the case of mobile telephones, one knows that they didn’t exist before a certain date and had a specific growth and growth pattern after that time. In the case of e.g. turnover, there may also be alternative data sources available for this kind of estimation (like VAT-register data). Consequently, the conversion coefficients can be adjusted to that knowledge. Besides using experts’ opinions, it’s also common to apply more sophisticated estimation techniques. Translation of this type of action to Business Surveys is unfortunately not easy. There are no alternative sources and there is no trend in long term development, since the surveys are designed to have the balances between positive and negative answers to hover around a certain long term average.
In brief: the macro method can deal with all types of relationships between the old and new NACE groups, the old grand totals remain intact and it is relatively simple and cheap to apply. It does however require assumptions, that will never be fully met.

**Quality aspects**
When trying to assess the quality of backcasted series, several aspects may be distinguished. Some of them are mutually conflicting and in the end it’ll be up to the Statistical Institutes and their users which aspects are most important. The main quality aspects are discussed below.

- Consistency with the old NACE Rev.1.1 series: in cases with only limited or no changes in the content of a NACE-code or aggregate, are the NACE Rev.2 results the same as the ones under NACE Rev.1.1?
- Transparency: are the transformations described by which the new series are derived from the old series?
- Representativity of the backcasted results for the new Nace Rev.2 codes. This aspect is important e.g. in the micro approach, where the question arises how imputations for non-response are treated: are the imputations made under NACE Rev.1.1 used or are the imputations calculated under NACE Rev.2? If the latter is the case, representativity is probably better, but the consistency and transparency decrease. The same holds if the NACE changeover is used to “clean up” the production systems for e.g. wrongly coded units that for the sake of comparability were kept in the old samples. Removing them improves representation but decreases transparency.

### 2.4. Combining micro and macro approaches
Micro and macro approaches each have different pro’s and con’s. One thing that they have in common however, is that the quality of their outcomes will deteriorate if you go further back in time. There are several approaches aimed at overcoming this problem by combining both approaches.

#### 2.4.1. Benchmark years/interpolation method
The first of these methods can be described as the benchmark/interpolation method. In this method, conversion coefficients are calculated for two different points in time using a micro method, after which the coefficients for the time points between these two are derived by interpolation using a macro method.

This method can deal with all types of relationships between old and new NACE groups, including 1-on-n and n-on-m relations. It decreases the necessity to rely on assumptions as well as problems of inconsistencies between old and new grand totals. It does however require the availability of micro data for old periods, for instance for 2000 or 1995.

This technique is a combination of the micro and the macro approach. According to this method, two periods have got to be double coded. These periods are called the benchmark periods. The optimal benchmark periods are to be determined by subject matter experts.

First of all, the micro data for the benchmarking periods are recoded to the revised classification. After that, two sets of conversion coefficients are obtained to convert the aggregated estimates from the initial to the revised classification. For the periods between the two benchmark periods, the coefficients are interpolated. For some subclasses, the evolution between the two benchmark periods might not have been linear. Therefore, a non-linear interpolating method could be used. As mentioned in the macro-approach, one could in such cases make use of experts’ opinions.
A possible variation of the method described consists in combining the coefficients determined for the two benchmark periods into a single set and then apply these conversion coefficients to all the periods of the time series. Just like the assumption made at the macro-approach, this assumption doesn’t always hold on. However, this assumption is less crude than the assumption related to the mentioned macro-approach. For the same reasons as mentioned at the macro-approach, the benchmark/interpolation method is not directly applicable to business survey indicators.

### 2.4.2. Backcasting conversion matrices as an intermediate step

A second possible approach is possible in cases were the micro method will be applied for e.g. three years. For a monthly or quarterly statistic, this allows to calculate 36 monthly of 12 quarterly conversion matrices. Based on such a data set, it is possible to analyse the structural patterns in the conversion matrix. Are there seasonal patterns in the conversion coefficients? In the case of 1-on-n splits, are there differences in the growth trend between the n new NACE groups? Obviously, in 1-on-1 conversions there would be no structural changes at all.

The outcomes of this analyses can be translated in simple models, that describe the development of the conversion coefficients for each row in a conversion matrix back in time. With this as an additional intermediate step, the macro methods can be improved in order to produce historical time series with a better quality for the earlier periods where micro data are no longer available.
3. Backcasting business survey indicators
With the basis methods described above in mind, time series of Business Survey data according to NACE rev. 2 will most probably derived by using a combination of methods: the micro method for the most recent years and macro methods for the years before that.

3.1. The micro approach
For the most recent years, institutes may find it easiest to use the double coded register at the moment of the implementation of NACE rev. 2 and apply the micro method for a limited number of years. Micro data are usually still available in a usable form and the production system for calculating weighted averages from panel data can be run again without much extra cost. The methodological problems of representativeness, loss of data because of unit dynamics, inconsistencies with the old grand totals et cetera probably have a relatively low impact.

A possibly important problem may occur where an existing code is split over a large number of new codes, like in a 1-on-5 reclassification. If the units from the old NACE group are evenly distributed over the new groups, the sample fractions of course remain the same. But if this is not the case, the sample fractions for one or more groups may become too low to achieve representative results and/or produce unstable results over time.

For the sake of notation, we abbreviate NACE Rev. 1.1 by \( O \) and NACE Rev.2 by \( S \). Computing time series in \( S \) on the basis of micro data in the population requires the defining of so-called aggregation matrices (see e.g. Kampen, 2007). The aggregation matrices consist of zeros and ones and classify the \( N_t \) businesses into the proper old respectively new classification codes at time \( t \), where \( a_{i t}^{O(0)} = 1 \) if business \( i \) belongs to class \( o \) at time \( t \), and \( a_{i t}^{O(0)} = 0 \) otherwise; and \( a_{i t}^{S(0)} \) defined similarly. We then have

\[
 f_{t}^{O(0)} = \sum_{i} a_{i t}^{O(0)},
\]

\[
 f_{t}^{S(0)} = \sum_{i} a_{i t}^{S(0)},
\]

\( i = (1, \ldots, N_t) \). This principle is generalizable to the computations of totals and means of variables. E.g., the backcasting of totals of a variable \( Y \) in \( S \) can be formulated as

\[
 Y_{t}^{S(0)} = \sum_{i} a_{i t}^{S(0)} y_{it},
\]

with \( y_{it} \) the observed value of \( Y \) for business \( i \) at time \( t \). Dividing (3.3) by the corresponding frequencies from (2) produces the means within \( S \) of \( Y \).

For confidence indicators an additional step is necessary. This type of qualitative statistics basically has three answer categories for each question: a positive one (like “increased”), a negative one (like “decreased) and a neutral one (like “remained the same”). For publication purposes, weighted percentages per answer category per question are calculated. Subsequently, the balance of positive and negative answers is calculated for each question, as the main variable. A weighted average of balances for a selected number of questions may then be calculated in order to arrive at e.g. producers’ confidence or an economic sentiment indicator, but that step will not be dealt with here.

So in the case of confidence surveys, for a given NACE Rev. 2 aggregate \( S \) the individual answers of firms \( i (1, \ldots, M) \) in the same answer category \( c \) are weighted by a “inner weight” \( iw_{i} \) and aggregated per type of answer, after which the total weight per answer category is divided by the total weight of all answer types. The percentage \( PC \) for answer category \( c \) in period \( t \) can be described as:
The calculation of percentages per answer category and of balances between positive and negative answers can be derived along the same lines as in (3.4) and (3.5).

3.2. The macro approach: two alternatives

For periods where micro data are not available in a usable form or where the micro approach creates large inconsistencies with the old grand totals, macro approaches may have to be applied. As mentioned before, in the case of 1-on-1 reclassifications, the macro approach acts the same as the key method and full consistency with the old series is achieved for those groups.

In general, macro approaches for statistics that measure levels (like turnover or persons employed) use estimates of the proportion of the volume of transitions between \( o \) and \( s \) at all periods of the historical time series. This requires at least one point in time \( t \) where dual coding at the level of micro data is available, producing (on the basis of the correspondence tables) a \( H_{ts} \) transition matrix that distributes at time \( t \) the \( H_o \) classifications in old codes to the \( H_s \) classifications in the new code. The frequencies \( f_{ts}^{S(o)} \) of businesses in \( S \) can be computed from the frequencies \( f_{ts}^{O(o)} \) of businesses in \( O \) by the relationship

\[
f_{ts}^{S(o)} = \sum_s p_{ts}^{O(o)s} f_{ts}^{O(o)},
\]

with \( 0 \leq p_{ts}^{O(o)s} \leq 1 \) denoting the proportion of businesses in old code \( o \) that transfer to the new code \( s \). For backcasting on the level of aggregate data, we use a generalisation of formula (3.8),

\[
PC_{t:S(o)} = 100 \times \frac{\sum_{i=1}^{m} iw_i a_{ts}^{O(o)}}{\sum_{i=1}^{n} iw_i a_{ts}^{S(o)}}. \tag{3.4}
\]
\[ Y_t^{S(i)} = \sum_o p_{Y_t^{O(i)}}^{S(i)} Y_t, \]  

(3.9)

with \( p_{Y_t^{O(i)}}^{S(i)} \) a set of weights that distribute the quantities of \( Y \) in \( o \) over \( s \).

Going back to (9), in the case of \( 1 \times 1 \) and \( h \times 1 \) transitions, the corresponding weights of course equal 1 and this approach is in fact the key method. In other cases, these weights have to be computed in the population or estimated from a sample,

\[ p_{Y_t^{O(i)}}^{S(i)} = \frac{\sum d_t^{O(i)} d_t^{S(i)} y_t^{O(i)} / \pi_t^{O(i)}}{y_t^{S(i)}}. \]  

(3.10)

Please note that these weights are in fact the shares of the components of the old NACE group that go to new NACE groups (the rows of the conversion matrix), so that the total of share equals 1 (or 100%) for the old NACE group. One can however also express the shares calculated for the components in the new NACE groups that come from various old NACE groups (the columns of the conversion matrix). This gives

\[ p_{Y_t^{S(i)}}^{O(i)} = \frac{\sum d_t^{O(i)} d_t^{S(i)} y_t^{O(i)} / \pi_t^{O(i)}}{y_t^{S(i)}}. \]  

(3.11)

In practice, computation of the weights will suffer from the same restrictions as backcasting on the basis of micro level data. It may then be decided to compute the transition matrix (3.10) only once, and approximate the historic time series by

\[ Y_{t-u} = \sum_o p_{Y_t^{O(i)}}^{S(i)} Y_{t-u}. \]  

(3.12)

This general approach cannot in this form be applied to confidence data from the business surveys, above all because conceptually it doesn’t make sense to distribute e.g. the percentage of positive answers of the balance between positive and negative answers in the same way as for instance turnover data. Apart from that, the approach also needs an extension with weights as in (3.4). Below, several ways are discussed to translate this general approach to confidence data.

3.2.1. calculating weighted averages from the old series

A first macro approach converts aggregated confidence indicators data according to NACE Rev. 1.1. by using a conversion table of the weighting scheme to calculate weighted averages of the “old”data for every NACE Rev. 2 publication aggregate.

First, the “outer weights” of the old NACE groups (\( OW^{O(i)} \)) or that are used to aggregate the results per NACE code to higher aggregates, have to be distributed over the elements of these groups that go to different new NACE groups (the cells in the rows):

\[ OW^{OS(i)} = p_{Y_t^{O(i)}}^{S(i)} OW^{O(i)}, \]  

(3.13)

with \( OW^{OS(i)} \) being the absolute value of the weight for the cells of the transition matrix.

Subsequently, these distributed weights are used to calculate a weighted average percentage \( PC \) for answer category \( c \) in period \( t-u \) per new NACE group (the columns of the conversion matrix),

\[ PC_{t-u}^{C} = \sum_s ( OW^{OS(i)} PC_{t-u}^{C O(i)} ) / \sum_s OW^{OS(i)}. \]  

(3.14)

This approach implicitly assumes that confidence is evenly distributed within all components of the
old NACE aggregate. In other words: every element of the old NACE aggregate that corresponds with a different new NACE aggregate has the same confidence as the other components. Statistics Netherlands has tested this approach on an existing data set of the Industry Survey. The method produces results that are consistent with the overall totals of the old series. The underlying assumption however of all elements of an old NACE aggregate having the same confidence does not hold for the Dutch situation.

3.2.2. using fixed ratio’s between the level of confidence between the components of an old group and the total for the old group

A second adaptation of the general macro approach to confidence indicators accepts that confidence levels (e.g. the percentage of positive answers) may differ within the components of an old NACE group. It calculates the ratio between confidence of every cell in the transition matrix and the confidence of the corresponding entire old NACE group (row in the matrix). For an old period $t-u$ this gives,

$$PC_{t-u}^{c_{S(i)}} = \sum_s (OW^{OS(os)} (PC_{t}^{c_{OS(os)}} / PC_{t}^{c_{O(o)}}) PC_{t-u}^{c_{O(o)}} ) / \sum_s OW^{OS(os)} .$$

(3.15)

This method implicitly assumes that the ratio $(PC_{t}^{c_{OS(os)}} / PC_{t}^{c_{O(o)}})$ is stable over time. The confidence levels of the cells $PC_{t}^{c_{OS(os)}}$ composing a given new NACE aggregate thus differ, but all cells coming from the same old aggregate still follow the same pattern over time. Statistics Netherlands also tested this approach on an existing data set of the Industry Survey. The method produces results that are consistent with the overall totals of the old series. A comparison with the results from a micro approach for several periods showed that ratio $(PC_{t}^{c_{OS(os)}} / PC_{t}^{c_{O(o)}})$ was …. over time.

References:

Black, O. “Overview of Benchmarking Methods”, presentation for the STS Task Force on NACE Rev.2 Luxemburg April 26 2007
Kampen, Jarl K., “NACE 1.1 to NACE 2.0 trasition: general strategies for the backcasting and retrapolation of time series in revised classification schemes”, Statistics Netherlands …..
4. Summary of survey results on NACE rev. 2, Part B: Reconstructing historical time series

Main conclusions
The survey conducted by the DG ECFIN Task Force shows that a majority of institutes have previous experience with recalculating time series, but methodological documentation is hardly available. Most institutes intend to produce time series according to NACE Rev. 2, but the planned length of these series differs from two or three years to over ten years. Micro methods are mentioned most.

Question B1: Do you have any previous experience in classification revision and especially in reconstruction / backcasting time series?

The majority of the countries (16 out of 21) report they have previous experience in classification revision. Estonia, Lithuania, Hungary, Austria and Slovenia declare they don’t have any previous experience in this field.

Question B2: Do you have some methodological documents concerning a previous classification revision as regards series reconstruction / backcasting?

Most countries (16 out of 21) don’t have methodological documents concerning the domain of classification revision. Denmark, Greece, France, Italy and the UK are the countries that in some way have methodological documents related to this subject.

Question B3: Would it be possible for you to place these methodological documents at the TF’s disposal?

Both Denmark and Greece state it’s not possible to place these documents at the TF’s disposal. France reports that it’s possible to place the documents, but at the same time they state that these documents only consist of a few memos of what has been done in 1999 and are not an inventory of all the possible methods. The document of the Italian institute handles the complete revision of the manufacturing survey in 2004, including backcasting of the series according to NACE Rev. 1.1 classification. The document is online available at: http://www.isae.it/Working_Papers/WP_Malgarini_n47_2005.pdf. The UK reports that the documents are only accessible if a review of the documents internally deems them robust enough for access.

Question B4: Do you intend to reconstruct / backcast the BCS series?

Apart from Bulgaria, Estonia and Luxemburg, all the countries intend to reconstruct / backcast the BCS series. Bulgaria is thinking about it.

Question B5: How far back do you intend to reconstruct / backcast the BCS series?

There’s no univocal answer to this question. Denmark intends to reconstruct / backcast the BCS series from 2005. The starting year of Spain is supposed to be 1993, while Italy’s will be 1991 (service survey 2003). Romania and Slovakia intend to reconstruct / backcast between one and four years.
Czech Republic, Lithuania, Hungary, Austria, Slovenia and the UK aim to reconstruct/backcast between five and nine years. Whereas Belgium, Germany, France, the Netherlands are willing to reconstruct/backcast 10 years and more. Poland didn’t mention a range of years, but wants to reconstruct/backcast as long as possible. Bulgaria, Estonia, Greece, Luxembourg and Sweden didn’t answer or answered “don’t know”.

**Question B6: At which level will you reconstruct/backcast the BCS series?**

Again there’s much diversity of answers. Belgium, Denmark, Germany, France and Slovakia intend to reconstruct/backcast the BCS series at 4-digit level (classes). The Netherlands and Italy state they want to reconstruct/backcast at 3-digit level (groups). The Czech Republic, Greece, Lithuania and Slovenia choose to reconstruct/backcast at 2-digit level (divisions). The UK, Romania and Spain will reconstruct/backcast at the level of main industrial groupings (industry and investment surveys) and sub-aggregates (retail trade and construction surveys). Bulgaria states they intend to reconstruct/backcast at aggregate level. Austria answered that they will reconstruct/backcast at the level as needed and possible by sample size and availability of weights. Poland will have the lowest level possible, depending on the survey. At last, Estonia, Luxembourg and Sweden didn’t answer this question.

**Question B7: Which method will you use to backcast the time series?**

The method based on detailed reworking of individual data is the method most mentioned. Nevertheless, Bulgaria, Lithuania, Poland and Sweden prefer to use proportional methods. Slovakia intends to use methods based on interpolation between benchmarks. The Netherlands will probably use a combination of proportional and interpolation methods. Romania states they will use a method based on coefficient by conversion at four digits level. Estonia, Lithuania and Slovenia didn’t answer this question.

**Question B7b: Which weighting system(s) will you use for the secondary aggregation of results when backcasting the time series?**

Belgium, Denmark, Germany, Spain, Italy, Hungary, the Netherlands, Slovakia and the UK report they will use the same weights on the whole backcasting period. The Czech Republic, Greece, Lithuania, Austria, Romania and Sweden intend to use annual weights (re)calculated in NACE Rev.2. France states they won’t use annual weights, but they might use two sets of weights (or one set each 5 years). Once the different sets available, they could use proportional or interpolation methods between two dates. Bulgaria, Estonia, Luxembourg, Poland and Slovenia didn’t answer this question.

**Question B8: Will you need to keep producing series in NACE Rev.1 until National Accounts will implement also NACE Rev.2 (and thus to produce series in both NACE Rev.1 and NACE Rev.2 if the implementation of NACE Rev.2 in BCS occurs before 09/2011)?**

Belgium, France, the Netherlands, Sweden and the UK are the only countries that at the moment intend to keep producing series in NACE Rev.1 until National Accounts will implement also NACE Rev.2. Greece and Poland didn’t answer this question. The rest of the countries answered negative.
**Question B9:** Can you give a first estimation of the impact of changes in classification in percentage of value added (or of turnover) for the following aggregates?

For the far majority of the member states it’s too premature to give a first estimation of the impact of changes in classification. The results of the countries that did give estimations, are summarized in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Bulgaria</th>
<th>Czech Republic</th>
<th>France</th>
<th>The Netherlands</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing ind.</td>
<td>0,6%</td>
<td>-5 a 5%</td>
<td>&lt;2%</td>
<td>-3%</td>
<td>-10%</td>
</tr>
<tr>
<td>Durable cons. goods</td>
<td>-8,5%</td>
<td>-5 a 5%</td>
<td>0</td>
<td></td>
<td>-5%</td>
</tr>
<tr>
<td>Non dur. cons. goods</td>
<td>1,3%</td>
<td>-5 a 5%</td>
<td>0</td>
<td></td>
<td>-5%</td>
</tr>
<tr>
<td>Total cons. goods</td>
<td>1,4%</td>
<td>-5 a 5%</td>
<td>0</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Investment goods</td>
<td>1,1%</td>
<td>-5 a 5%</td>
<td>&lt;1%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Intermediate goods</td>
<td>-0,5%</td>
<td>-5 a 5%</td>
<td>&lt;1%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Investments</td>
<td>1,2%</td>
<td>&lt;1%</td>
<td>-3%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>4,2%</td>
<td>5 a 10%</td>
<td>4%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Retail trade</td>
<td>-1,8%</td>
<td>0</td>
<td>4%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>3,6%</td>
<td>5%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>