

## Background

The Scottish Government holds historic manufacturing data from a number of different sources. We have integrated these datasets in order to produce a broadly consistent time-series of employee and financial variables.

Work involved in producing this integrated dataset included:

- Looking at what variables were available, and in which years
- Considering how best to integrate the various datasets
- Up-rating Scottish Register Employment data to allow for units with 10 or fewer employees
- Down-rating early *employment* data to be consistent with later *employee* data
- Up-rating early *GVA at factor cost* data to be consistent with later *GVA at basis prices* data
- Converting all data to a **SIC 2007** Industry Group level

Information on Standard Industrial Classification (SIC) codes can be found at:

<https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uk sic2007>

## Time series data

Only a limited number of variables in an aggregated SIC format were available in early years for the manufacturing sector. It was therefore determined that time series data at an Industry Group level only (on a SIC 2007 basis) would be produced for a selection of variables which spanned most years. **SIC 2007** Industry Groups produced cover:

<i>Industry Group</i>	<i>SIC 2007 (2-digit codes)</i>
Food, Beverages & Tobacco products	10,11,12
Textiles, Wearing apparel & Leather products	13,14,15
Wood, Paper & Printing products	16,17,18
Coke, Chemicals, Pharmaceutical, Rubber & Mineral products	19,20,21,22,23
Basic and Fabricated metals, Machinery, Motor Vehicles & Other transport equipment	24,25,28,29,30
Computer, electronic & Electrical equipment	26,27
Furniture, Other manufacturing, Repair & installation	31,32,33

## Data used in integrated Manufacturing dataset

### ▪ Scottish Register of Employment (SRE)

In the integrated manufacturing dataset, Scottish Register Employment (SRE) employee figures for 1950-1969 only were used.

The SRE contains data on *manufacturing* units with greater than ten employees (a unit being defined as a single manufacturing site). The data runs from 1950 to around 1993 and was collected from a range of sources by the Scottish Government (then the Scottish Office). Data collection was discontinued because of the increasing scope of the Office for National Statistics (ONS) surveys.

SRE data was converted to a SIC07 basis via a number of steps. Initially SRE data at a 2-digit level was mapped from SIC80 to SIC92 and then for robustness data was aggregated to a SIC92 Industry Group level. Correlation factors were then calculated to scale the SRE data to match Scottish Production Database figures (more information below on this database).

Next, SRE only contains information on units where employment is greater than ten. In order to take account of the 'missing' data (i.e. units with ten or less employees), scaling factors were applied to the aggregated SRE data. The factors were calculated using averages determined by analysing data at SIC92 Industry Group level where total employment was divided by the employment figures for units with greater than ten employees.

By this point, SRE data had been converted to a SIC92 Industry Group basis with imputed employment for manufacturing units with ten or less employees. The SIC92 codes were then mapped to SIC07 using scaling factors calculated by analysing SIC03 v SIC07 data at an Industry Group level (at this level of analysis, any differences between SIC92 and SIC03 codes are negated). After factors applied, SRE data was then aggregated to the appropriate SIC07 Industry Group level.

Finally, 1950-1969 SRE employment data on a SIC07 basis needed to be downrated to match employee data available in later years. For this, scaling factors were calculated by analysing employee v employment data at Industry Group level and then factors applied to 1950-1969 data.

At this stage, 1950-1969 data had been converted to SIC07 Industry Group level and employee variable was consistent with other datasets.

Please note that it was determined, for consistency, to use employee data from 1970 onwards from alternative sources outlined below rather than from SRE database.

- **Scottish Production Database (SPD)**

In the integrated manufacturing dataset, Scottish Production Database (SPD) financial and employee figures for 1970-1997 only were used.

SPD data was sourced from returns from an annual sample survey, the Annual Census of Production (ACOP). This was a large survey of companies in the production sector carried out each year by the Office for National Statistics.

SPD data is not held in a consistent format over the period.

- From 1970 to 1978, data is available on a SIC68 basis
- From 1979 to 1991, data is available on a SIC80 basis
- From 1992 to 1997, data is available on a SIC92 basis

Following SIC conversions were therefore undertaken.

Firstly, the 1970 to 1978 data available on a SIC68 basis was converted in stages. Initially, this data was mapped from SIC68 to SIC80 and then to SIC92 codes mainly at a 2-digit SIC level. Then the SIC92 codes were mapped to SIC07 codes using scaling factors calculated by analysing SIC03 v SIC07 data at a 2-digit level (at this level of analysis, any differences between SIC92 and SIC03 codes are negated). After factors applied to 1970-1978 data, it was then aggregated to the appropriate SIC07 Industry Group level.

Secondly, the 1979 to 1991 data available on a SIC80 basis was also converted in stages. Initially, the data was mapped from SIC80 to SIC92 at a 2-digit level. Then the SIC92 codes were mapped to SIC07 codes using scaling factors calculated by analysing SIC03 v SIC07 data at a 2-digit level (at this level of analysis, any differences between SIC92 and SIC03 codes are negated). After factors applied to 1979-1991 data, it was then aggregated to the appropriate SIC07 Industry Group level.

Thirdly, the 1992 to 1997 data available on a SIC92 basis was converted to a SIC07 basis. The SIC92 codes were mapped to SIC07 codes using scaling factors calculated by analysing SIC03 v SIC07 data at a 3-digit level (at this level of analysis, any differences between SIC92 and SIC03 codes are negated). After factors applied to 1992-1997 data, it was then aggregated to the appropriate SIC07 Industry Group level.

At this stage, 1970-1997 data had been converted to SIC07 Industry Group level. However, there were two further issues with the data:

(a) 1970-1997 employment data on a SIC07 basis needed to be downrated to match employee data available in later years. For this, scaling factors were calculated by analysing employee v employment data at Industry Group level and then factors applied to 1970-1997 data.

(b) 1976-1995 GVA at factor cost data on a SIC07 basis needed to be uprated to match GVA at basic prices data available in later years. For this, scaling factors were calculated by analysing GVA at factor cost v GVA at basic prices at Industry Group level and then factors applied to 1976-1995 data.

For information, GVA variable is not available prior to 1976, whilst for 1996 onwards GVA at basic prices is available in datasets.

At this stage, 1970-1997 data had been converted to SIC07 Industry Group level and its variables were consistent with other datasets.

- **Scottish Annual Business Statistics (SABS)**

In the integrated manufacturing dataset, Scottish Annual Business Statistics (SABS) financial and employee figures for 1998 onwards were used.

Scottish Annual Business Statistics (SABS) is based on data from the Annual Business Survey (ABS) (formerly Annual Business Inquiry (ABI)) conducted by the Office for National Statistics. The ABS is an annual survey of registered businesses covering the production, construction, distribution and service industries which represent the UK Business Economy. This is about two thirds of the UK's whole economy in terms of Gross Value Added.

SABS data is not held in a consistent format over the period.

- From 1998 to 2006, data is available on a SIC92 / SIC03 basis (*any differences between SIC92 and SIC03 codes are negated at level analysis undertaken at*)
- From 2007 onwards, data is available on a SIC07 basis

For 1998-2006 data, following SIC conversion was undertaken. SIC92 / SIC03 codes were mapped to SIC07 codes using scaling factors calculated by analysing SIC03 v SIC07 data at a 3-digit level (at this level of analysis, any differences between SIC92 and SIC03 codes are negated). After factors applied, 1998-2006 data was then aggregated to the appropriate SIC07 Industry Group level.

For 2007 data onwards, SIC07 codes already in datasets were used to aggregate data to a SIC07 Industry Group level.

At this stage, 1998 data onwards had been converted to a SIC07 Industry Group level and its variables were consistent with other datasets.

### **Converting current prices to constant prices**

Integrated manufacturing dataset contains data on a SIC07 Industry Group level basis **at current prices**. Time series charts using this data have been compiled.

Integrated data **at constant prices** has also been produced. Current price data was converted using UK GDP deflators from Treasury website (at 2017 prices).

Please note that Charts do not include **GVA at constant prices**. Scottish Quarterly GDP series (includes Manufacturing) is already published on Scottish Government website.

### **Per Employee Charts**

Per Employee Charts for selected financial variables have been compiled. For this, data for a financial variable is divided by the corresponding employee data to create a Per Employee figure e.g. Labour Costs data is divided by employees to create Labour Costs per employee values.

### **Charts for industries as proportion of Scottish manufacturing sector in each year**

Charts have been compiled for selected financial variables which show industries as a proportion of Scottish manufacturing sector **in each year**. This is calculated by dividing variable totals for the seven sub-Manufacturing industries by the *overall* manufacturing sector total in the same year.

Charts should allow users to look at changes in industries over-time, although proportions do **not** show magnitude of actual figures. So for example, "Food, Beverages & Tobacco as a % of Manufacturing" may have risen in a specific year not necessarily due to an increase in its actual figures but due to a proportionally greater decrease in actual figures in the other sub-Manufacturing industries.

### **SIC 2007 compared to SIC 2003**

Please note that the Manufacturing sector **reduced** under SIC 2007 compared to SIC 2003. This adjustment has been applied to all time series data in the Charts. For information, a background paper on **Assessing the Impact of SIC 2007** can be found at: <http://www.gov.scot/Topics/Statistics/Browse/Business/Corporate/sic2007note>

### **Conclusion**

As outlined in this technical note, a considerable amount of estimation (particularly in converting data in early years to a SIC 2007 basis) was involved in producing the historic integrated dataset. Also, the datasets that have been combined have methodological differences in terms of sample collection and modelling processes to gross survey returns to business populations. No allowance is made for such differences in integrated dataset.

It is therefore anticipated that the manufacturing time series will be of most use in graphical form to look at long term trends, rather than looking at specific values for specific years. The dataset will be updated annually as each new year's data becomes available (which will also include revision of previous year's data).