Methodology for the NI Index of Services (IOS)

Background

The quarterly Index of Services (IOS) was first published in NI on 18 May 2005. It provides a measure of growth in the output of the private sector service industries in NI (this is defined as SIC07 sections G to S). Following an assessment by the UK Statistics Authority, the IOS was designated as a National Statistic on 5 August 2011.

Index numbers

An index number is a convenient form of expressing a series in a way that makes it easier to see changes in that series. The numbers in the series are expressed relatively, with one number in that series chosen to be the 'base' (usually expressed as 100) and other numbers being measured relative to that base. Index numbers have the advantage that they allow different types of data to be combined on a consistent basis, e.g. deflated current price data with volume data. The aim of the IOS is to provide a reliable indicator of short-term changes in the output of the service sector. Index numbers are a very good way of communicating this message. For example, an IOS quarterly value of 104.4 means that the level of output for that quarter is 4.4% higher than the base year value of 100. The NI IOS is a Laspeyres volume index. The UK economic accounts are based on the European System of Accounts (ESA), which in turn is based on the UN System of Accounts (SNA). The ESA-preferred type of output indicator is one that measures deflated gross output (or turnover) for an industry. These use an approximate price change estimator to remove the effects of inflation. For this reason, we and the ONS, use a Laspeyres volume index (as opposed to Paasche, Lowe or Fisher indices). The ONS paper on the **Methodology of the Monthly Index of Services (Annex A: Mathematical Formulation of the Index of Services)** explains Index numbers theory.

Methodology

Sample

The IOS sample size is approximately 3,400 businesses, drawn on a SIC07 basis; comprising both census and sample businesses. The stratified sample of service industries is selected directly from the Inter-Departmental Business Register (IDBR), stratifying businesses by industry and business size. The sample consists of a census of dominant businesses and a Neyman stratified random sample of the remaining businesses. The census element consists of all businesses employing 100 or more employees and those employing 0 to 99 employees and having an annual turnover of £10 million or more. It is desirable to include these high turnover low employment businesses in the sample in order to provide a more comprehensive picture of

the overall economy. This sample has been designed to give sufficiently accurate results whilst keeping the costs to businesses to a minimum.

2014 sample refresh
The IOS sample was refreshed for Quarter 1 2014 and was drawn on a SIC07 basis. The sample was boosted from around 1,600 businesses and it is now approximately 3,400 companies. Self-administered questionnaires were posted to both the new and existing businesses on each sample, for three quarters, as a means to calculate a link factor between the old sample (up to and including Quarter 4 2013) and the new sample (from Quarter 1 2014 onwards). With advice from ONS Methodologists, as the result of a successful Quality Improvement Fund, a methodology has been developed in order to integrate the new samples without making significant changes to the back series data, thus giving a meaningful index.

The NI IOS is annually chain-linked (chain-linking involves the linking of growth estimates between different time periods in order to produce a continuous time series) using private sector GVA estimates derived from regional accounts using the fourth quarter of the preceding year as the link period. Inaccuracies caused by the assumption of a stable relationship between GVA and turnover are reduced using this methodology. When annual weights are used the assumption only has to be maintained from one year to the next year. A paper **detailing the chain-linking process** has been published by ONS.

The standard method for linking two series (for example one based on a SIC03 sample and one based on a SIC07 sample) is to calculate the index under the old and new circumstances over some link period, and then apply the growth of the subsequent new series to the old series. As the relationship of both samples to the IDBR was known, the IDBR was used to provide the link period. Thus, the ratio of the IDBR turnover for Quarter 1 2011 and Quarter 2 2011 is known. We have the Quarter 2 2011 value (SIC07) and the Quarter 1 2011 value (converted from SIC03 to SIC07). We can, therefore, create the following link factor:

$$\text{link factor} = \frac{(\text{Q2 2011 sample estimate} * \text{IDBR Q1 2011 value})}{(\text{Q1 2011 sample estimate} * \text{IDBR Q2 2011 value})}$$

This can then be applied to the converted back series, thus retaining the previous growth rates.

For Quarter 1 2014 and Quarter 2 2014, questionnaires were issued to companies in both the existing sample and the new sample, thus allowing a link factor to be calculated based on the average percentage change between the two. This link factor was then applied to each of the quarterly turnover back series (grossed & deflated), in order to give a series of the same magnitude as the new sample series (from Quarter 1 2014 onwards).

Data collection, validation and Index calculation
Survey forms are issued quarterly, immediately after the period to which they relate. For example, forms are issued in October asking for information relating to July to September. Since the beginning of 2016, a QBS form was issued to all businesses who previously received an IOS form and/or a Quarterly Employment Survey (QES) form. Companies are also asked to provide employment and turnover information at the same time. This combined survey form, coupled with the roll-out of an 'eForm' (designed to collect data electronically) has reduced the burden to businesses which had previously received two separate forms at different times.

Data validation is carried out ensuring that data falls within the expected limits, contacting the company where appropriate for clarification.

The overall IOS is calculated by weighting together industry level indices that describe the activity of an industry sector using the SIC. This is done using relative shares of regional GVA on an annual basis. The annual weights from regional GVA are more up to date and their use is in line with recommendations from ONS.

Seasonal adjustment
The index numbers in this statistical bulletin are all seasonally adjusted. This aids interpretation by removing annually recurring fluctuations, for example due to holidays or other regular seasonal patterns. All IOS time series are checked on an annual basis using X-13 ARIMA SEATS for evidence of seasonality, and those series where seasonality is detected are adjusted using X-13 ARIMA SEATS in order to obtain a clear picture of the general trend. Unadjusted data are also available.

The figures presented in this publication are calculated using the X-13 ARIMA SEATS method of seasonal adjustment. ONS have provided a **guide to seasonal adjustment with X-12 ARIMA**, as an updated guide for X-13 ARIMA SEATS is currently being finalised by ONS.

Summary quality report
A summary quality report for this publication can be found on the **IOS Quality and Revisions** page of the website,

Status of figures in IOS bulletin
The base year of the NI IOS is updated in line with ONS.

All figures are published to one decimal place. Results are based on unrounded figures and may not agree with the published constituent parts.

Results are provisional and subject to revision, which can be made for a variety of reasons. This may occur as a result of late responses to surveys, estimates being replaced by actual data, revisions to seasonal adjustment factors, methodological changes and changes to business classifications.

Comparisons between the IOS and the Annual Business Inquiry (ABI) may not necessarily match because of definitional and coverage differences.

Planned future revisions
The IOS revisions policy can be found **here**.

The SIC 47 code of retail is scheduled to be constructed as a separate series and it is planned to publish this series in the near future.

Publication of results on a SIC07 basis
A SIC was first introduced into the UK in 1948 for use in classifying business establishments by the type of economic activity in which they are engaged. The UK is required by European legislation to revise the SIC in parallel with NACE (the statistical classification of economic activities in the European Communities) so that both systems are identical down to and including the four digit class level. More information on SIC07 can be found **here** and **here**.

The SIC07 sections covered by the NI IOS are as follows:

Broad Industry Group / Sector	Section		SIC	Description
G&I - Wholesale, retail, repair, Accommodation & food services	G	Wholesale and retail trade; repair of motor vehicles and motorcycles	45	Wholesale and retail trade and repair of motor vehicles and motorcycles
			46	Wholesale trade, except of motor vehicles and motorcycles
			47	Retail trade, except of motor vehicles and motorcycles
	I	Accommodation and food service activities	55	Accommodation
			56	Food and beverage service activities
H & J - Transport, storage, information & communication	H	Transportation and storage	49	Land transport and transport via pipelines
			50	Water transport
			51	Air transport
			52	Warehousing and support activities for transportation
			53	Postal and courier activities
	J	Information and communication	58	Publishing activities
			59	Motion picture, video and television programme production, sound recording and music publishing activities
			60	Programming and broadcasting activities
			61	Telecommunications
			62	Computer programming, consultancy and related activities
			63	Information service activities
KLMN - Business services and finance	K	Financial and insurance activities	64	Financial service activities, except insurance and pension funding
			65	Insurance, reinsurance and pension funding, except compulsory social security
			66	Activities auxiliary to financial services and insurance activities
	L	Real estate activities	68	Real estate activities
	M	Professional, scientific and technical activities	69	Legal and accounting activities
			70	Activities of head offices; management consultancy activities
			71	Architectural and engineering activities; technical testing and analysis
			72	Scientific research and development
			73	Advertising and market research
			74	Other professional, scientific and technical activities
			75	Veterinary activities
	N	Administrative and support service activities	77	Rental and leasing activities
			78	Employment activities
			79	Travel agency, tour operator and other reservation service and related activities
			80	Security and investigation activities
			81	Services to buildings and landscape activities
			82	Office administrative, office support and other business support activities
PQRS - Other services	P	Education	85	Education
	Q	Human health and social work activities	86	Human health activities
			87	Residential care activities
			88	Social work activities without accommodation
	R	Arts, entertainment and recreation	90	Creative, arts and entertainment activities
			91	Libraries, archives, museums and other cultural activities
			92	Gambling and betting activities
			93	Sports activities and amusement and recreation activities
	S	Other service activities	94	Activities of membership organisations
			95	Repair of computers and personal and household goods
			96	Other personal service activities