UK Index of Production QMI

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To be announced

Table of contents

1 . Methodology background

National Statistic		**Frequency**	Monthly
		How compiled	ONS surveys and third party data
		Geographic coverage	UK
		Sample size	6,000 for Monthly Business Survey and census for administrative data.
		Last revised	24 January 2017

2 . Important points about UK Index of Production data:

- The Index of Production (IoP) measures output in the manufacturing (the largest component of production), mining and quarrying, energy supply, and water supply and waste management industries.

- IoP is an output measurement and used as a proxy for measuring the production industry's gross value added (GVA).

- Approximately 70% of the IoP estimates are based on turnover data collected by the Monthly Business Survey (MBS), the remaining are from volume data received from the Department for Business, Energy and Industrial Strategy (BEIS) and Iron and Steel Statistics Bureau (ISSB).

- Care should be taken when interpreting the month-on-month IoP growth rate estimates; monthly time series are volatile and therefore they should be interpreted alongside the 3 monthly and year on year estimates to give a better indication of the actual growth trends.

- The index numbers in the statistical bulletin are seasonally adjusted in line with international best practise; non-seasonally adjusted indices are also available as a time series.

- All series, unless otherwise quoted, are chained volume measures; deflators created from price indices adjust the turnover series to take out the effect of price change to give the volume series.

- The IoP values are currently referenced to 2013=100 so that the average index for 2013 is equal to 100. International comparisons can be made, but care should be taken of the reference years of the indices in both sets of data.

- The geographical coverage includes all businesses whose primary output resides within the UK.

Overview of the output

The UK Index of Production (IoP) provides a timely indicator of growth in the output of production industries at constant prices. The purpose of the IoP is to produce a short-term measure of the output of the production industries. The geographical coverage includes all businesses whose primary output resides within the UK. This includes England, Scotland, Wales and Northern Ireland but excludes the Isle of Man and Channel Islands.

The IoP covers four broad sector groupings: mining and quarrying, manufacturing, energy supply, and water supply, sewerage and waste management. The IoP is one of the main components of the output approach to measuring gross domestic product (GDP(O)), representing 14.6% of UK GDP as of 2013.

IoP use data from a variety of sources and are calculated by taking turnover and removing the impact of price changes, or by using direct volume estimates. The majority of data used to compile the manufacturing sector, which accounts for around 70% of the Index of Production, are collected as "turnover values" via the Monthly Business Survey (MBS) which is a monthly sample of around 6,000 businesses. The majority of the turnover values are then deflated using Producer Price Indices (PPI) and Export Price Indices (EPI) into volume series. Some series in the water supply sector are deflated using Services Producer Price Indices (SPPI). In addition, direct volume series are collected by the Department of Business, Energy and Industrial Strategy (BEIS) for fuel industries; and International and Steel Statistics Bureau (ISSB) for steel industries.

The IoP is currently referenced to 2013 = 100. For international comparisons within the European Union (EU), the IoP is delivered monthly to Eurostat who publish this data on their website, referenced to 2010 = 100.

The total IoP estimate and various breakdowns are widely used in private and public sector institutions, particularly the Bank of England and Her Majesty's Treasury, to assist in informed policy and decision-making.

3 . Output quality

This document provides a range of information that describes the quality of the data and details any points that should be noted when using the output.

We have developed Guidelines for Measuring Statistical Quality; these are based upon the 5 European Statistical System (ESS) Quality Dimensions. This document addresses these quality dimensions and other important quality characteristics, which are:

- relevance

- timeliness and punctuality

- coherence and comparability

- accuracy

- output quality trade-offs

- assessment of user needs and perceptions

- accessibility and clarity

More information is provided about these quality dimensions in the sections below.

4 . About the output

Relevance

(The degree to which the statistical outputs meet users' needs.)

The primary purpose of the Index of Production (IoP) is to produce a short-term measure of the output of the production industries within the UK economy and show the monthly movements in the gross value added (GVA) of the production industries (Standard Industrial Classification 2007 (SIC 2007)) sections B to E). GVA is defined as "total outputs minus total inputs". The 4 main components of the production industries are: mining and quarrying (B), manufacturing (C), electricity, gas, steam and air conditioning (D), and water, sewerage, waste management and remediation activities (E). The IoP contributes 14.6% to the output estimate of gross domestic product (GDP). The index is estimated using the same data sources and National Accounts methodology as the quarterly estimate of production industries' gross value added within the output approach to measuring GDP.

The main external users of the IoP are: Bank of England (BoE); Her Majesty's Treasury (HMT); Office for Budget Responsibility (OBR) and Cabinet Office. Their primary use of the data is to inform decisions on fiscal and monetary policy and as such the monthly IoP statistics are essential for their briefing and forecasting purposes. User group meetings are held once a quarter to address any issues with the data (including changes to methods) and to ensure that user needs and requirements are still met (for more information see the assessment of user needs and perceptions section). The IoP is also used for analysing economic performance of the production sector. Other users include business and research communities, economic and financial organisations, the media and the general public.

The monthly IoP publication provides estimates of the percentage change of: the most recent month on the same month a year earlier; the most recent month on the previous month; the most recent 3 months on the same 3 months a year earlier; and the most recent 3 months on the previous 3 months. Users are reminded of the volatility of monthly estimates in the statistical bulletin; however the publication of these 4 measures of percentage change is in line with user requirements.

Although the IoP is a monthly indicator, it is based on a range of data collected monthly and quarterly from a small number of different sources. These include data from the Monthly Business Survey (MBS), which is our short-term survey on different parts of the economy and is one of the main data sources used in the compilation of the manufacturing sector and thus IoP. The data collected are sales turnover excluding Value Added Tax (VAT). These data are then deflated using Producer Price Indices (PPI). The detailed deflators were chosen due to their appropriateness in deflating the products manufactured by the various industries, with weights generated from the National Accounts SUTs. PPIs are the most conceptually appropriate deflators for manufacturing industries because they actually measure price changes in manufactured goods at the time they leave the producer (also known as factory gate prices), excluding taxes on products (such as VAT). Thus, they are completely consistent with the turnover data from the MBS.

A comprehensive list of the IoP source data can be found in the GDP(O) source catalogue published on our website. Some of the indicators are derived using current price turnover deflated by a suitable price index and others are direct volume series. Other data sources that feed into manufacturing and other IoP components include data from the Department for Business, Energy and Industrial Strategy (BEIS) and data from the Iron and Steel Statistics Bureau (ISSB). All the data sources were assessed against internationally defined criteria for relevance and conceptual appropriateness. Methods were classed as "A" (ideal), "B" (acceptable), or "C" (requiring improvement). For detail see Section 3 and Annexes 1 and 2 of the GDP(O) Improvement Report, June 2016.

In Autumn 2016, changes were agreed with the UK Statistics Authority and announced to our GDP(O) continuous improvement programme. The program of industry reviews detailed in the GDP(O) improvement report has since been superseded by two work-streams. The Economic Statistics Transformation Programme (ESTP) work-stream focuses on comparative analysis of the monthly and annual approaches to the measurement of the output measure of GDP. This is to inform the development of the new National Accounts target operating model, including the introduction of quarterly supply use balancing. Secondly, the Quality Assurance of Administrative Data (QAAD) work-stream is concerned with reviewing and providing more detail on the wide range of administrative data sources used in the production of the short term output indicators, in line with the UK Statistics Authority's Regulatory Standard for the Quality Assurance of Administrative Data. Administrative data assessments are currently underway for a number of industries which use a large amount of administrative data sources, including the electricity and gas industries supplied by BEIS. Reports will be published in due course, beginning in 2017.

We will review our service level agreements with BEIS following the outcome of the administrative data assessment review due to be published in 2017. The current service level agreement with BEIS details the requirements in terms of timeliness and quality of the data supplied, as well as detailed briefing on the key stories within their data. This agreement was most recently reviewed in December 2013.

The next GDP(O) improvement report will be published alongside Quarterly National Accounts consistent with Blue Book 2017.

Timeliness and punctuality

(Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the gap between planned and actual publication dates.)

The IoP is published on our website approximately 26 working days after the end of the reference month. It is the earliest official performance indicator of UK industry. As the IoP is a short-term indicator, the main users want the figures to be available as soon as possible after the end of the period to which they refer. As a result, revisions are an inevitable consequence of the trade off between timeliness and accuracy.

For more details on related releases, the UK National Statistics release calendar is available online and provides 12 months' advance notice of release dates. If there are any changes to the pre-announced release schedule, public attention will be drawn to the change and the reasons for the change will be explained fully at the same time, as set out in the Code of Practice for Official Statistics. Publication dates for IoP are fixed.

5 . How the output is created

The Index of Production (IoP) is designed to measure the change in the gross value added (GVA) of the production industries. GVA is defined as "total outputs minus total inputs". Conceptually, GVA for each industry should be estimated by revaluing both the outputs and the inputs; then subtracting the latter from the former, but in practice more information is available on outputs than on inputs so changes in output are frequently used as an approximate indicator of changes in GVA.

A full description of the data sources and methodologies used to compile the IoP can be downloaded from the IoP Methodology page of our website.

Weighting

Each industry in the IoP is expressed as an index series and therefore, to be able to compile higher level aggregates, the industries are weighted together. This is done according to their relative contribution to total gross domestic product (GDP), based on their GVA at a set point in time. In general, the larger the GVA for a particular industry, the larger its relative contribution to total GDP and as such the higher the "weight" associated with that industry.

The indicator weights at class level (fixed base weights) which is normally below the level of 4-digit SIC 2007 are updated every 5 years. The base year was updated to 2010 as part of Blue Book 2014. The indicator weights at group level (normally equates to 4-digit SIC) and above are updated every year when weights are available from Blue Book.

Index construction

The index is constructed within the Central ONS Repository for Data (CORD), an ONS in-house computer system that is widely used in compiling the UK National Accounts. Some input data are delivered in raw component form (that is, all the lowest level "building blocks") and are assembled within the IoP system. Others come already "partially assembled", as aggregates or volume derivatives and are input at a later stage in the system. More information can be found in the IoP Methodology web page.

Time series

Where monthly estimates are not available (for example when data are delivered quarterly or annually), a monthly path is interpolated. Interpolation (sometimes referred to as temporal disaggregation) is the process of producing a time series at a higher frequency than is actually available, for example, a monthly series from quarterly data. This is a common need across National Accounts, where the accounting framework demands inputs that are not available as frequently as required. Within IoP, all of the current price turnover series and external volume series received by BEIS and ISSB are monthly. A small number of services producer price indices for the water supply sector, average weekly earnings series and data for the public sector are interpolated as a monthly path.

Statistical disclosure control

Statistical disclosure control methodology is also applied to the data. This ensures that information attributable to an individual organisation is not disclosed in any publication. The Code of Practice for Official Statistics, and specifically Principle 5: Confidentiality, set out practices for how we protect data from being disclosed. The Principle includes a guarantee to survey respondents to "ensure that official statistics do not reveal the identity of an individual or organisation, or any private information relating to them". More information can be found on our Methodology page. This is applied to all our data sources. Data sources from external suppliers are never supplied in a form which would enable identification of individual businesses.

Relationship with National Accounts

As stated previously in this report, all of the data sources and methods used to compile the IoP are consistent with those used in the production industries element of the output (or production) approach to measuring gross domestic product (GDP) in the [Quarterly National Accounts][44]. As the IoP conforms to the National Accounts framework, it is also subject to the same [revisions policy][45] and [quarterly and annual coherence adjustments][46] as the output approach to measuring GDP.

It should be noted that the National Accounts are estimates of economic activity based on statistical surveys, administrative data, forecasts and models and are not compiled through "accounting" in the common sense of the word.

6 . Validation and quality assurance

Accuracy

(The degree of closeness between an estimate and the true value.)

There is no simple way of measuring the accuracy of the IoP, that is, the extent to which the estimate measures the underlying "true" value of the output growth (of the production and manufacturing industries) in the UK for a particular period. For many statistics, we are able to estimate and publish the sampling error associated with the estimate, using this as an indicator of accuracy. The IoP, however, is constructed from a variety of data sources, some of which are not based on random samples. As a result, it has not yet been possible to measure the sampling error.

Research to measure the standard error was completed and published in Survey Methodology Bulletin No.75 Spring 2016 using the standard errors of the growths for the year 2014. We are planning to work on updating this for regular publication in the IoP statistical bulletin.

One of the dimensions of measuring accuracy is reliability, which can be measured using evidence from analyses of revisions to assess the closeness of early estimates to subsequent estimated values. Figures for the most recent months are provisional and subject to revision in light of (a) late responses to surveys and administrative sources, (b) forecasts being replaced by actual data and (c) revisions to seasonal adjustment factors, which are re-estimated every month and reviewed annually. The results of revisions analysis are regularly presented in the excel tables which accompany each IoP statistical bulletin. These, alongside revisions spreadsheets containing the data behind this analysis, are available on the IoP page on our website.

The IoP has been designated as a National Statistic by the UK Statistics Authority.

Coherence and comparability

(Coherence is the degree to which data that are derived from different sources or methods, but refer to the same topic, are similar. Comparability is the degree to which data can be compared over time and domain for example, geographic level.)

Every effort is made to ensure that the series is comparable over time, and a comparable time series is available back to 1948 for higher level aggregates. Where possible, changes to methodology are applied to the whole series to ensure this comparability is maintained. However, National Accounts revision policy may mean that there is a time lag before methodological changes are published for the complete time series.

The IoP is produced in compliance with the EU Short-term Statistics regulation, ensuring that equivalent data for all 28 EU Member States are comparable. Data for the EU are published monthly, by Eurostat.

All of the data sources and methodologies used to compile the IoP are consistent with those used in the production industries element of the output approach to measuring GDP. The IoP data are benchmarked to the quarterly production index published as part of the output approach to measuring GDP, so that the arithmetic mean of the 3 monthly indices is equal to the quarterly index.

Information on the compilation of GDP can be found in the GDP Quality and Methodology Information report.

Concepts and definitions

(Concepts and definitions describe the legislation governing the output and a description of the classifications used in the output.)

The Index of Production (IoP) is produced in compliance with the EU Short-term Statistics regulation. The categories used for classifying industries in the IoP are the UK version of the latest international standard classification of industries, usually abbreviated to SIC 2007.

Definitions of terms found within the main statistical bulletin are listed below.

Chained volume measure

A chained volume series is a series of economic data from successive years, put in real (or constant, that is, inflation- and deflation-adjusted) terms by computing the production volume for each year in the prices of the preceding year, and then "chain linking" the data together to obtain a time-series of production figures from which the effects of price changes (that is, monetary inflation or deflation) have, at least in theory, been removed.

Gross domestic product

The total value of production activity in the economic territory. It is defined as total output (sales plus changes in inventories, or stocks) less intermediate consumption (all the goods and services used up in a process of production, for example components and raw materials). Domestic product can be measured gross or net of consumption of fixed capital (or depreciation). It is presented in the accounts at market (or purchasers') prices. A further distinction is that it can be at current prices or chained volume measures.

Index number

A measure of the average level of prices, quantities or other measured characteristics relative to their level for a defined base reference period or location. It is usually expressed as a percentage above or below, but relative to, the base index of 100.

Seasonal adjustment

The data published in the IoP release are all seasonally adjusted (although non-seasonally adjusted estimates are also available on our website). This aids interpretation by removing annually recurring fluctuations, for example, caused by holidays or other seasonal patterns.

Seasonal adjustment removes regular variation from a time series. Regular variation includes effects caused by differing month lengths, different activity near particular events such as shopping activity before Christmas and regular holidays such as the May bank holiday. Some features of the calendar are not regular each year, but are predictable if we have enough data – for example the number of working days in a month or the date of Easter may have a significant effect. As Easter changes between March and April we can estimate its effect on time series and allocate it between March and April depending on where Easter falls. Estimates of the effects of day of the week and Easter are used respectively to make trading day and Easter adjustments prior to seasonal adjustment.

Deflation

It is common for the value of a group of financial transactions to be measured in several time periods. The values measured will include both the change in the volume sold and the effect of the change of prices over that year. Deflation is the process whereby the effect of price changes (or inflation) is removed from a set of values to derive the volume. These volumes are described as "at constant prices".

Within the IoP, all series, unless otherwise quoted, are chained volume measures at basic prices. Deflators adjust the value series to take out the effect of price changes to give the volume series.

7 . Other information

Output quality trade-offs

(Trade-offs are the extent to which different dimensions of quality are balanced against each other.)

As previously stated in this report, the Index of Production (IoP) is published on our website approximately 26 working days after the end of the reference month. As the IoP is a key component in the compilation of the gross domestic product (GDP) indicator, the timeliness of the data is crucial, but there is a trade off between accuracy and timeliness. Provisional outputs are timelier, but expectations of accuracy and reliability in early estimates are often too high as early estimates are based on incomplete data. Revisions are an inevitable consequence of the trade off between timeliness and accuracy. More information on revisions can be found in the Accuracy section.

Assessment of user needs and perceptions

(The processes for finding out about uses and users and their views on the statistical products.)

Following the UK Statistics Authority re-assessment in 2014, a report was published and a redesigned statistical bulletin was introduced for IoP. Further improvements to statistical bulletins were introduced in short-term statistics released from January 2017. We improved the format and structure of statistical bulletins, making them shorter and more insightful. We also began publishing related data at the same time under new "theme" days to increase the coherence of our data releases including an over-arching economic picture of all the data published.

Upcoming user events will be advertised in the IoP statistical bulletin. As part of the GDP(O) Continuous Improvement Project, seminars may be held, these are open to any interested users and presentation material will be published on our website. Feedback from users is also welcomed via email.

8 . Other information

Sources for further information or advice

Accessibility and clarity

(Accessibility is the ease with which users are able to access the data, also reflecting the format in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the release details, illustrations and accompanying advice.)

Our recommended format for accessible content is a combination of HTML web pages for narrative, charts and graphs, with data being provided in usable formats such as CSV and Excel. Our website also offers users the option to download the narrative in PDF format. In some instances other software may be used, or may be available on request. Available formats for content published on our website but not produced by us, or referenced on our website but stored elsewhere, may vary. A recent announcement was made that government departments should move to open standards for documents. Future business plans will incorporate the adoption of these standards where appropriate. For further information please refer to the contact details at the beginning of this document.

For information regarding conditions of access to data, please refer to the links below:

- Terms and conditions (for data on the website)

- Accessibility

In addition to this Quality and Methodology Information, quality information relevant to IoP is available in the background notes of the [Index of Production statistical bulletin](#).