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Information paper

Quality and Methodology Information

General details

Title of output: Business Register and Employment Survey
Abbreviated title: BRES
Designation: National Statistic
Geographic coverage: United Kingdom (UK), Great Britain (GB), Region, Local Authority
                          County
Date of last SQR or QMI[*]: September 2011
Contact details: annual.employment.figures@ons.gov.uk

Executive summary

The Business Register and Employment Survey (BRES)[1] has been assessed[2] by the United
Kingdom Statistics Authority (UKSA) for compliance with the Code of Practice for Official
Statistics and granted National Statistic status.

BRES publishes employee and employment estimates at detailed geographical and industrial
levels. It collects comprehensive employment information from businesses in England, Scotland
and Wales representing the majority of the Great Britain economy. Independently collected
Northern Ireland data are then combined to produce estimates on a United Kingdom basis.
High level estimates are published on the Office for National Statistics (ONS) website[3]
and detailed regional estimates are published on the National On-line Manpower Information
Service (NOMIS®)[4] website. BRES is regarded as the definitive source of official Government
employee statistics by industry.

This document contains the following sections:
- Output quality;
- About the output;
- How the output is created;
- Validation and quality assurance;
- Concepts and definitions;
- Other information, relating to quality trade-offs and user needs, and;
- Sources for further information or advice.

Output quality

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

ONS has developed Guidelines for Measuring Statistical Quality[5]; these are based upon the six
European Statistical System (ESS) quality dimensions. This document addresses the quality
dimensions and important quality characteristics, which are:
- Relevance;
- Timeliness and punctuality;
- Comparability;
- Coherence;
- Accuracy;
- Output quality trade-offs;

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[*] Quality and Methodology Information' (QMI) replaced 'Summary Quality Reports' (SQR) from 04/11

- Assessment of user needs and perceptions, and;
- Accessibility and clarity.

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

About the output
Relevance
The degree to which the statistical outputs meet users' needs.

BRES publishes employee and employment estimates at detailed geographical and industrial levels. It collects comprehensive employment information from businesses in England, Scotland and Wales representing the majority of the Great Britain economy. The Department of Enterprise Trade and Investment Northern Ireland (DETINI)[6] collects the same BRES information independently in Northern Ireland. Both data sources are then combined to produce estimates on a UK basis. BRES is regarded as the definitive source of official Government employee and employment statistics by industry. Employment is obtained by adding the number of working owners to the number of employees employed by a business where working owners include sole traders, sole proprietors and partners who receive drawings and/or a share of profits, but are not paid via PAYE.

In terms of data, the survey sample of approximately 80,000 businesses is weighted up to represent the GB economy covering all sectors. BRES data are not only used to produce employee and employment statistics but also to update the Inter Departmental Business Register (IDBR), which is the main sampling frame used for all ONS business surveys. One of the strengths of BRES is that estimates are provided at detailed geographical and industrial levels (down to a lower super output geography at a 5-digit Standard Industrial Classification (SIC)). No other ONS employment survey output provides such information at these low levels and this enables a detailed analysis of employment at low level geographies.

It should be noted BRES is a sample survey and produces estimated employment figures. These estimates are of a good quality at higher levels of geography (for example region). The quality of the estimates deteriorates as the geographies get smaller and this should be taken into account when considering the quality of sub-national estimates.

BRES is a point-in-time snapshot of the GB/UK economy and is not designed to be used as a time series as BRES estimates are subject to discontinuities from time to time.

Publication on the National Statistics website

BRES figures published on the ONS website are released within a Statistical Bulletin along with a number of detailed supplementary tables. The levels at which the estimates are published are indicated by a tick in table 1 below. The majority of published estimates have a quality measure attached and all figures on the ONS website are subject to standard ONS disclosure rules.

Table 1: The levels at which BRES estimates are published on ONS website

Geography/Industry	5-digit SIC*	BIG**	Overall Totals
UK /GB inc private / public sector splits	✓	✓	✓
Region inc private / public sector splits		✓	✓
Local Authorities (county/metropolitan) inc private / public sector splits			✓

*SIC: Standard Industrial Classification

**BIG: Broad Industry Group

Publication on the National On-line Manpower Information Service (NOMIS®)

BRES publishes GB-based estimates on NOMIS®. Estimates published on NOMIS® are disclosive aggregate estimates down to a Lower Super Output Area (LSOA) geography at a 5-digit UK Standard Industrial Classification 2007 (SIC 2007)[7]. Access to the BRES estimates is via the purchase of a Notice which contains an associated Data Access Agreement (DAA). The purchase of a Notice requires users to abide by the terms of the DAA.

Table 2: Key points of the BRES and BRES methodology

	BRES
What is published?	On the ONS website: The number of employees in the United Kingdom economy on a public/private and full-time/part-time basis from a GB 5-digit (UK 3-digit) SIC 2007 level to a Local Authority County total. On NOMIS®: The number of employees in the GB economy on a full-time/part-time basis down to a 5-digit SIC and LSOA geography level.
Frequency	Annual.
Sample size	Approximately 80,000.
Periods available	From 2009.
Sample frame	Inter-Departmental Business Register.
Sample design	Stratified random sample where the strata are defined as SIC 2007, country, and employment size of a business.
Weighting	Each responding business represents a number of similar businesses from the IDBR, based on number of employees and the SIC 2007. The sampling weights are adjusted for non-response and births and deaths within the BRES business universe and are combined with calibration weights, based on IDBR employee counts, to produce overall weights. Calibration is carried out at enterprise level. Weights are calculated annually.
Estimation	Estimation is based on local unit returns: direct domain estimation is used for high levels of aggregation whereas minimum domain estimation is used for lower levels.
Outliers	Winsorisation is the outlier treatment method used, which requires specifying parameter values using past data which is updated regularly.
Part-time definition	For the purpose of the survey, part-time is classed as 30 hours per week or less.

The BRES data and estimates are used widely, both inside and outside government, and are a vital source of business employee information. The key users and uses of the output include:

- Eurostat - BRES is a source of annual structural statistics for the Structural Business Statistics Regulation (SBSR), used for policy monitoring and formulation by the European Union (EU) via Eurostat[8].
- The Scottish Government (SG) and the Welsh Government (WG) - BRES provides estimates on employee numbers which are essential in the calculation of Scottish Government[9] and Welsh Government[10] employment trends. Estimates on all sectors are incorporated into the Scottish and Welsh figures and may also be used in internal briefings.
- Department of Business, Innovation and Skills (BIS) - The UK Department for Business, Innovation and Skills (BIS)[11] uses BRES estimates to assess the structure and performance of industries.
- Workforce Jobs - It is used for the Workforce Jobs series (WFJ), much of which is initially based on the Short Term Employment Survey's estimate of employee jobs, to be benchmarked on the BRES estimate. This benchmarking usually takes place in time for the December Labour Market Statistics First Release[12] in the following year.
- Annual Business Survey (ABS) - The ABS[13] collects financial data via the BRES questionnaire which are then matched to employment estimates to calculate turnover per head.
- Local Government - Local Government planning departments are major users of BRES using the estimates published on NOMIS® to forecast trends in employment in their specific areas and to claim for Central Government and European funding.
- BRES is one of the key data sources used to compile Nomenclature of Units for Territorial Statistics (NUTS) 2 and 3 Gross Value Added (GVA) data, with the NUTS2 data the key input to the allocation of EU structural funds to deprived regions of the EU.
- Additional users include national government departments and bodies, businesses, academics and the general public. User groups are consulted to ensure that the data remain relevant to their needs.

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.

For more details on related releases, the UK National Statistics Publication Hub[14] 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[15].

The following list shows the time lag between publication and the reference period to which the data refer. These timings are for the publication of the BRES estimates for the 2010 survey period.

1.   Provisional results: 12 months after the reference period.
2.   Revised results: 24 months after the reference period.

The time lag between publication and the period to which the data refer is considered the minimum required to produce estimates of a high enough quality to meet all user needs taking into consideration:
- the amount of time it takes contributors to complete and return the BRES form (as BRES asks for detailed local unit information it can take contributors with a large number of local units a significant period of time to return all the completed forms),
- the large size of the BRES sample (some 80,000 contributors),
- the validation and quality checking of the data and estimates prior to publication.

BRES revisions policy

The BRES revisions policy states the following:
- Following the initial publication of the data for year t in September of year t+1, the data will be revised and re-released in September of year t+2 (that is at the same time as the release of the provisional data for year t+1).
- The revisions will arise from a complete rerun of survey results, taking on any new returned data, revised imputations and re-weighting. The complete revised dataset will be re-released as the final dataset. Proposed revisions outside of this regime will be logged by the results team and, if resources permit, considered for release.
- Revisions might also arise under other circumstances, for example, following a change in methodology or the introduction of a new SIC. If so, these revised datasets will be re-released in a planned, coordinated, way.
- Significant revisions will be explained to both internal users and external users at the time of release, subject to the usual rules on confidentiality.

It should be noted that estimates are liable to revision only if they meet the criteria contained within the revisions policy itself.

How the output is created

Coverage

BRES estimates cover UK businesses registered for Value Added Tax (VAT) and/or Pay As You Earn (PAYE) and are classified to SIC 2007. It covers all major industry groups, such as production, construction, distribution, service trades and many more groups in SIC 2007.

BRES obtains the required details on these businesses from the IDBR which is then used as the survey sampling frame.

The sample does not cover Northern Ireland. Northern Ireland contributor data are supplied directly to ONS by DETINI. These data are added to the GB based tables produced by the BRES results system to produce UK based estimates published on the ONS website. It should be noted that low level aggregate estimates published on NOMIS® are derived using estimates based on the BRES GB sample and universe.

Likewise, the survey does not collect farm agriculture data. These data are supplied at an aggregated level by the Department for Environment, Food and Rural Affairs (DEFRA)[16], the Scottish Government, the Welsh Assembly Government and the Department of Agriculture and

. These are supplied at an aggregated, not individual local unit, level. This means it is only possible to include farm agriculture at the lowest aggregated level of geography supplied, which is a Region level. These data are added to the estimates after BRES estimation has been run and are then included in the aggregate estimates.

Sample design

The BRES sample currently contains around 80,000 businesses from across the Great Britain economy. The IDBR is used as the sampling frame from which a stratified random sample is drawn. The strata are defined by SIC 2007 by country and by employment size, with all employment sizes of businesses being covered. The design is a stratified one stage clustered sampling, where the stage one units (or clusters) are enterprises, or reporting units (RUs), and the elements in each cluster are local units.

- An enterprise can be defined as the smallest combination of legal units that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations. An enterprise may be a sole legal unit.
- A reporting unit (RU) is the unit used for collection of information through statistical surveys. In most instances it equates to the enterprise but for the more complex businesses it is part of an enterprise defined by a list of local units ('local unit list reporter').
- The local unit (LU) is an enterprise or part thereof (e.g. a workshop, factory, warehouse, office, mine or depot) situated in a geographically identified place. At or from this place economic activity is carried out for which, save for certain exceptions, one or more persons work (even if only part-time) for one and the same enterprise.

If an enterprise is selected, then all its constituent local units are selected. Data are requested from each local unit. Broadly, the sample is stratified into: large or complex enterprises, unusual enterprises, and medium and small enterprises. Medium and small enterprises are further stratified by country (England, Scotland and Wales) and two-digit SIC 2007. The strata containing large, complex or unusual businesses and medium sized enterprises in Scotland and Wales are fully enumerated.

Adjusting design weights to unit non-response and births and deaths

Unit non-response is addressed via re-weighting and the standard ONS method for births and deaths adjustment is used: both adjustments are carried out at either sampling stratum level or post-stratum level (see below). The adjusted design weight is given by

$$dweight = \frac{N}{n_r}\left(1 + \frac{n_d h_{bd}}{n_r - n_d}\right)$$

where N is the total number of enterprises in the universe in a given stratum, n_r is the number of responding enterprises, n_d is the number of dead enterprises among the respondents, and h_{bd} is the births-to-deaths ratio. The design weight is also referred to as the a-weight. In ONS, the birth-to-deaths ratio h_{bd} is set to 0 for businesses with a very large employment and 1 for other businesses. To implement this adjustment, ONS post-stratified the cells containing very large businesses (cells 1, 3 and 7) into two subcells each: a subcell for businesses with an employment equal to or exceeding a specified threshold and a subcell with employment below the threshold. The threshold has been set to 250. In the three subcells containing businesses whose employment equals or exceeds the threshold the births-to-deaths ratio has been set to 0; elsewhere this ratio has been set to 1.

Calibration

The adjusted design weights are calibrated with respect to total register employee counts. It is a two-way calibration with respect to industry classification (by section) and region, and it is carried out at RU level. Two calibration, or model, groups are defined: one group for cells containing large businesses, and another group for the remainder of the cells. It is assumed that the variance of RU returns is proportional to the register employee counts. Within each

calibration group, the adjusted design weights are calibrated so that, in each section and each region, the estimate of total register employee count is equal to the total register employee count. Because calibration is at RU level, there is no need to adjust for births and deaths of local units. This is dealt with directly at the estimation stage. The estimation tool used to compute the calibration weights is the Generalized Estimation System (GES).

Outlier treatment

The estimation for the survey variables in BRES is based on local unit returned values; the treatment of outliers is also applied at local unit level. Winsorisation is the outlier treatment method used; this requires obtaining predicted values for the local units with returns.

Winsorisation parameter values (often referred to as L-values) have been derived for all three survey variables: total employees, full-time employee and part-time employees. Once all three variables have been winsorised, the components (full-time and part-time) are scaled to add up to the winsorised total employee value.

Estimation

Estimation is based on local unit level returned data, which means domains are defined on the basis of local unit SIC and region. So, the estimate of the total of a given variable Y in domain D is given by

$$\hat{T}_{y,D} = \sum_{i \in s_r} \sum_{l \in D} a_i g_i \tilde{y}_{i,l}$$

where a_i and g_i are the adjusted design and g-weights for responding RU i, respectively, s_r is the set of responding RUs, and $\tilde{y}_{il}$ is the winsorised value of the return from local unit l in RU i.

Variance estimation

Standard errors and coefficients of variation for every specified domain are produced by the tool GES.

Minimum domain methodology

Minimum domains are the lowest level at which direct estimates are considered robust. Although BRES collects data at the individual local unit level, it estimates employment for all non-sampled local units in the BRES business universe. The weighted estimate is spread pro-rata across the non-surveyed units on the basis of their IDBR registered employment, while returned values are preserved, giving estimates with relatively low variance even at very detailed levels, but at the expense of introducing some bias. The current minimum domains are set at the geography level 'region' and a combination of 2-digit and 3-digit SIC 2007 industry levels. The use of minimum domains provides good quality estimates at low level geographies, although this method means that accurate standard errors cannot be calculated for estimates below the minimum domain level.

The estimates produced by GES do not reflect the use of minimum domains and tend to be very large for low levels of aggregation. Approximate standard errors that take into account the minimum domain methodology but that ignore the bias introduced can be produced using the bootstrap method (re-sampling techniques for inferring the distribution of a statistic derived from a sample). The approach taken is to use GES for levels of aggregation at or above the minimum domains, overall and by public and private, and to use the bootstrap for levels below the minimum domains.

For the 2010 revised and 2011 provisional estimates, the minimum domains for the 2-digit SIC 2007 84 and 85 were changed from region by a combination of 2-digit and 3-digit SIC 2007 industry levels, to Region by 2-digit SIC 2007 industry levels only. This was in response to the potential for overestimation of non-sampled businesses in these SIC 2007 industries where a small number of non-sampled units lay outside the sample domain.

Statistical disclosure

BRES is conducted under the Statistics of Trade Act (STA) 1947. This Act imposes restrictions on the way that data collected during the survey may be used. The provisions of the STA are further regulated by the Employment and Training Act 1973 (ETA) as amended by the Employment Act 1989, which states that local planning authorities may use confidential data only for purposes that relate to development plans.

The main aim of these restrictions is to protect the identity of individual businesses, which have made statistical returns, from being disclosed or otherwise deduced. Some of the outputs have already been subjected to disclosure control and, therefore, the issue of confidentiality does not arise. However, employee information extracted by users of the NOMIS® database has not been suppressed and contains potentially disclosive cells.

Access to NOMIS® is restricted, by the provisions of the ETA 4(3) (f), to holders of Chancellor of the Exchequer's Notices. From 2007 onwards, users are required to sign up to a Data Access Agreement (DAA) and are bound by the conditions contained within, in order to access the estimates.

Users of BRES estimates on NOMIS® are personally responsible for ensuring that any information which they publish or pass on to other users does not contain disclosive figures. More information is provided via the BRES Guide to Use of Potentially Confidential Data[18].

Validation and quality assurance
Accuracy
The degree of closeness between an estimate and the true value.

Estimates are subject to various sources of error. Total error consists of two elements, the sampling error and the non-sampling error. More detail on estimates and measures of these errors can be found on the ONS website. Quality measures will also be published alongside all standard outputs on the ONS website which will provide useful information for the users on the quality of the data.

Sampling error

BRES is based on a sample survey estimating the number of employees, which gives rise to sampling errors. The actual sampling error for any estimate is unknown but we can estimate, from the sample, a typical error, known as the standard error. This provides a means of assessing the accuracy of the estimate, when an unbiased, or approximately unbiased estimator is used. The lower the standard error, the more confident we can be that the estimate is close to the true value. The coefficient of variation (CV) can be calculated as the standard error divided by the estimate, and it is used to compare the relative accuracy across surveys or variables. The CV is one indicator of the quality of the estimate; the smaller the CV the higher the precision.

Quality measures are published alongside outputs, which will provide useful information for the users on the quality of the data. The CVs and standard errors are available at all geographies published on the ONS website. The CVs and standard errors are calculated from current Geography[19] estimates.

Non-sampling error

Non-sampling errors are not easy to quantify and include errors of coverage, measurement, processing and non-response. Response rates give an indication of non-response bias in estimates when it can be assumed that the differences between responders and non-responders are the same regardless of response rates.

In seeking to maximise the accuracy of the survey estimates, the sample selection is carried out after the annual IDBR update processes are complete. This should minimise the selection of misclassified businesses and inadequate coverage of newly established businesses and defunct reporting units.

Various procedures are in place to ensure that errors are minimised. Year-on-year comparisons are made at respondent, local unit and aggregate level. Disparities are investigated to ensure consistent annual returns. Congruence checks are made against other surveys to ensure consistent values across industries from different surveys.

As BRES is used to both update the IDBR and to produce estimates, there is a risk of feedback bias. To reduce this bias to a minimal level, the register employee count is modelled using survey data, and the modelled values are used in the auxiliary variable in calibration.

Another indicator of accuracy is reliability, which can be measured by assessing the difference between the first published estimate and the final revised figure. BRES adheres to a Revisions Policy whereby current survey estimates together with a revision of the previous year's survey estimates are published. Late returns or information received in the course of the following year's survey may lead to changes in the estimation after publication. Such changes are incorporated into the figures when the revised estimates are published the following year.

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

BRES replaced the Annual Business Inquiry part 1 (ABI/1)[20] employee survey. BRES brings a new methodology and change in data source compared to the ABI/1, which had been published on a comparable basis since 1997. Any comparison to the ABI/1 estimates must be treated with caution. Work has been undertaken to identify and explain the reasons for, and impact of, any discontinuity and a paper relating to this can be found on both NOMIS® and the BRES product page. Scaling factors can be calculated by using the estimated BRES and ABI/1 2008 estimates to produce a time series on a consistent basis. Further details of the discontinuity analysis can be found on the **BRES Guidance and Methodology page[21].**

 The figures are collected and published according to the SIC 2007 industrial classification in line with Eurostat guidelines. With regards to the ABI/1, data for 1997-2002 were collected under SIC 1992[22] and data from 2003 onwards collected under SIC 2003[23]. Both the 2007 and 2008 ABI/1 estimates were published on a SIC 2003 and SIC 2007 basis.

BRES 2011 working owners discontinuity

The BRES questionnaire was amended for the 2011 survey to ensure that the way that directors of limited companies respond to the survey is correct. On the BRES questionnaire, respondents are asked to return the number of working owners, and the number of employees. Cognitive testing by ONS has shown that directors of limited companies in many cases believe themselves to be working owners. However, guidance from Her Majesties Revenue & Customs (HMRC) shows that they should technically be classified as employees of the company. In order to ensure that limited companies return their information in this way for the 2011 survey, changes were made to the questionnaire to route directors of limited companies around the working proprietor question, instead going straight to the employees question. The outcome of this is that some of the directors who would have previously been classified as working owners will now be classified as employees. This has increased the BRES estimate of employees and caused a discontinuity in the 2011 results.

ONS has published further information on the impact of this change which can be found in the BRES working owners discontinuity article[24].

Users of BRES require that ONS employment statistics be coherent with each other; this is achieved by applying congruence checks between BRES and Monthly Business Survey (MBS) returns and using common methods where possible. As the BRES sample size is bigger than that of MBS, BRES outputs are more accurate and so estimates from the Workforce Jobs Series are benchmarked to BRES estimates on an annual basis.

The Labour Force Survey (LFS)[25] is regarded by ONS as the best measure of total jobs in the economy. The BRES outputs are regarded as the best estimates at a detailed regional and industrial level. The main differences between them are:
- BRES is a point-in-time survey requesting employee counts on a specific date in the year. The LFS estimates are averages for three-month periods,
- the LFS is employment based only; BRES collects both employee and employment based data,
- the LFS definition of employment is anyone (aged 16 or over) who does at least one hour's paid work in the week prior to their LFS interview, or has a job that they are temporarily away from (for example on holiday). On the other hand, BRES produces point-in-time estimates of full and part-time employees on the payroll,

- unlike BRES, LFS includes people who do unpaid work in a family business, Government Supported Trainees and HM Forces. It should be noted that although BRES includes the self employed in its business universe there may be some element of under coverage of self employment reported to BRES as it includes the self-employed only if they are registered for VAT or PAYE. As the LFS includes very small businesses which are below both VAT and PAYE thresholds, employee estimates from LFS and BRES are not directly comparable,
- LFS is a household survey while BRES is a survey of businesses. There is often a conflict between which industry people actually work in and which they think they work in, and LFS relies on respondents to self-classify to an industry. The answers that employees give in response to the LFS industry question may be influenced by the nature of their own job, which may not reflect the main activity of the organisation for which they work. As a result BRES figures give a more reliable industry breakdown than LFS.

BRES has also improved the timeliness of the employment data on the IDBR through an increased sample size and improved design. This leads to an improvement in the accuracy of all estimates produced from register-based surveys through better information from the auxiliary variable (for example, employment).

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

The BRES definition of an employee is anyone working on the BRES reference date who is aged 16 years or over that the contributor directly pays from its payroll(s), in return for carrying out a full-time or part-time job or being on a training scheme. Part-time workers are classed as those who work 30 hours per week or less.

This includes:
- all workers paid directly from the business's payroll(s),
- those temporarily absent but still being paid, for example on maternity leave,
- employees at sites where the planned activity is for less than one year,
- employees at sites manned for less than 20 hours per week.

This excludes:
- any agency workers paid directly from the agency payroll,
- voluntary workers,
- former employees only receiving a pension,
- self-employed workers (not paid via the business's payroll(s)) where identified,
- working owners who are not paid via PAYE.

Employment is obtained by adding the number of working owners to the number of employees. Working owners include sole traders, sole proprietors and partners who receive drawings and/or a share of profits, but are not paid via PAYE.

BRES also collects data to fulfil the UK's obligations under the Structural Business Statistics (SBS) Regulation of the European Union, established by the Council Regulation (EC, Euratom) No 58/97 of 20 December 1996. This established a common framework for the production of Community statistics on the structure, activity, competitiveness and performance of businesses in the Community. Data are transferred to Eurostat and used for policy monitoring and formulation by the EU, and as a source for annual structural statistics.

Other information
Output quality trade-offs
Trade-offs are the extent to which different dimensions of quality are balanced against each other.

BRES provisional results are published 12 months after the reference period. The time lag between publication and the period to which the data refer is the minimum required to produce estimates of a high enough quality to meet user needs. These results are revised 24 months after the reference period and can be considered more reliable in that they include late responder data or the correction of data errors that were not identified in time for the provisional release.

Further information on release dates and the BRES revisions policy are contained in the Timeliness and punctuality section of this paper.

Assessment of user needs and perceptions
The processes for finding out about users and uses, and their views on the statistical products.

BRES employs a number of forums to obtain user views and the uses to which BRES data is put, such as:
- the BRES User Group, comprising delegates selected from government bodies who have applied for a BRES notice from NOMIS[®],
- information obtained from NOMIS[®] regarding who requests access to BRES data, and their reasons for wanting this access,
- internet based research looking at what uses are made of the BRES tables published on the ONS website,
- regular consultation with users in Local Government via the Central & Local Government Intelligence Partnership (CLiP)[26],
- frequent ad hoc meetings with Welsh Government and Scottish Government,
- during the development of the BRES, a web consultation exercise was undertaken inviting users of annual employment estimates (which at the time was from the Annual Business Inquiry) to provide their views and comments. These comments were used in developing BRES to ensure user needs were met. A paper was published summarising the views of users in response to this open consultation. A copy of both the consultation document and response can be found on the ONS website: Business Register and Employment Survey for Users[27].

An analysis of BRES users who apply for a Chancellor's Notice to access BRES employee estimates on NOMIS[®] was used to ascertain the main users of BRES and can be found in Table 3. This shows that around half of the users who held a Notice to access the 2010 BRES estimates were from central and local government, with commercial organisations also making up a significant percentage at thirty-three percent.

Table 3: Main users of BRES estimates on NOMIS[®]

Description	Areas selected	Percentage
Central/Local Government and NHS	20,300	48
Commercial	14,000	33
Not-for-profit Organisation	2,700	6
University	1,600	4
Training Body	900	3
Personal	500	2
School / College	100	0
Total	**42,200**	**100**

There are a number of plans to further ONS's knowledge of the uses of BRES. These include:
- expanding the BRES user group by using responses to the voluntary web questionnaire to see if there are any key users of BRES that might be interested in attending the user group,
- review annually the usage made of the BRES data from NOMIS[®],
- consulting local government users regarding specific uses made of the BRES statistics.

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.

ONS's recommended format for accessible content is a combination of HTML webpages for narrative, charts and graphs, with data being provided in usable formats such as CSV and Excel. The ONS 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. 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)

- [Copyright and reuse of published data](#)
- [Pre-release access (including conditions of access)](#)
- [Access to unpublished data](#)
- [Access to microdata via the Virtual Microdata Laboratory](#)
- [Accessibility](#)

In addition to this Quality and Methodology Information, Basic Quality Information relevant to each release is available in the background notes of the relevant [Statistical Bulletin](#)[28].

References

	Title of Reference	Website Location
1	Business Register Employment Survey (BRES)	http://www.ons.gov.uk/ons/publications/all-releases.html?definition=tcm:77-230512
2	Assessment reports: UK Statistics Authority	http://www.statisticsauthority.gov.uk/assessment/assessment/assessment-reports/index.html
3	Office for National Statistics (ONS) website	http://www.statistics.gov.uk/default.asp
4	National On-line Manpower Information service (NOMIS ®)	http://www.NOMIS®web.co.uk
5	Guidelines for Measuring Statistical Quality	http://www.ons.gov.uk/ons/guide-method/method-quality/quality/guidelines-for-measuring-statistical-quality/index.html
6	Department of Enterprise, Trade and Investment (DETINI)	http://www.detini.gov.uk/deti-stats-index.htmn
7	SIC 2007	UK Standard Industrial Classification 2007 (UK SIC 2007)
8	Eurostat	http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home
9	Scottish Government	http://www.scotland.gov.uk
10	Welsh Government	http://wales.gov.uk/?lang=en
11	Department for Business, Innovation and Skills	http://www.bis.gov.uk/
12	Labour Market Statistics First Release	http://www.ons.gov.uk/ons/search/index.html?pageSize=50&newquery=Labour+Market+Statistics+first+release
13	Annual Business Survey (ABS)	http://www.ons.gov.uk/ons/search/index.html?newquery=ABS
14	UK National Statistics Publication Hub	http://www.statistics.gov.uk/hub/release-calendar/index.html
15	Code of Practise for Official Statistics	http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html
16	Department for Environment, Food and Rural Affairs (DEFRA)	http://ww2.defra.gov.uk/
17	Department of Agriculture and Rural Development Northern Ireland (DARDNI)	http://www.dardni.gov.uk/index/dard-statistics/statistical-reports/agricultural-census.htm
18	BRES Guide to Use of Potentially Confidential Data	http://www.NOMIS ®web.co.uk/notices/docs/infoguide.pdf

19	Guide to Geographies available on BRES	http://www.ons.gov.uk/ons/search/index.html?pageSize=50&newquery=ONS+geography
20	Annual Business Inquiry part 1	http://www.ons.gov.uk/ons/search/index.html?newquery=ABI/1
21	BRES Guidance and Methodology page	http://www.ons.gov.uk/ons/guide-method/method-quality/specific/labour-market/business-register-and-employment-survey--bres-/index.html
22	SIC 1992	http://www.ons.gov.uk/ons/guide-method/classifications/archived-standard-classifications/uk-standard-industrial-classification-1992--sic92-/index.html
23	SIC 2003	http://www.ons.gov.uk/ons/guide-method/classifications/archived-standard-classifications/uk-standard-industrial-classification-1992--sic92-/index.html
24	BRES working owners discontinuity article	http://www.ons.gov.uk/ons/guide-method/method-quality/specific/labour-market/business-register-and-employment-survey--bres-/bres-working-owners-discontinuity-article.pdf
25	Labour Force Survey	http://www.ons.gov.uk/ons/search/index.html?pageSize=50&newquery=LFS
26	Central and Local Government Intelligence Partnership (CLiP)	http://www.clip.local.gov.uk/lgv/core/page.do?pageId=1
27	Business Register and Employment Survey for Users	http://www.ons.gov.uk/ons/about-ons/user-engagement/consultations-and-surveys/archived-consultations/2006/business-register-and-employment-survey-for-users/index.html
28	BRES 2011 Statistical Bulletin	http://www.ons.gov.uk/ons/rel/bus-register/business-register-employment-survey/2011-provisional/stb-bres-2011.html

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Quality and Methodology Information

General details

Title of output: Business Register and Employment Survey
Abbreviated title: BRES
Designation: National Statistic
Geographic coverage: United Kingdom (UK), Great Britain (GB), Region, Local Authority County
Date of last SQR or QMI[*]:February 2013
Contact details: annual.employment.figures@ons.gov.uk

Executive summary

The Business Register and Employment Survey (BRES)[1] publishes employee and employment estimates at detailed geographical and industrial levels. It collects comprehensive employment information from businesses in England, Scotland and Wales, representing the majority of the Great Britain (GB) economy. Independently collected Northern Ireland data are then combined to produce estimates on a United Kingdom (UK) basis. High level estimates are published on the Office for National Statistics (ONS) website[2] and detailed regional estimates are published on the National On-line Manpower Information Service (NOMIS)[3] [®] website. BRES is regarded as the definitive source of official government employee statistics by industry.

This document contains the following sections:
• Output quality;
• About the output;
• How the output is created;
• Validation and quality assurance;
• Coherence and comparability
• Concepts and definitions;
• Other information, relating to quality trade-offs and user needs; and
• Sources for further information or advice.

Output quality

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

ONS has developed Guidelines for Measuring Statistical Quality[4]; these are based upon the five 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; and
• Accessibility and clarity.

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

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[*] Quality and Methodology Information' (QMI) replaced 'Summary Quality Reports' (SQR) from 04/11

About the output

Relevance

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

BRES publishes employee and employment estimates at detailed geographical and industrial levels. It collects comprehensive employment information from businesses in England, Scotland and Wales representing the majority of the GB economy. The Department of Finance and Personnel Northern Ireland (DFPNI)[5], collects the same BRES information independently in Northern Ireland. Both data sources are then combined to produce estimates on a UK basis. BRES is regarded as the definitive source of official government employee and employment statistics by industry. Employment is obtained by adding the number of working owners to the number of employees employed by a business where working owners include sole traders, sole proprietors and partners who receive drawings and/or a share of profits, but are not paid via PAYE.

In terms of data, the survey sample of approximately 80,000 businesses is weighted up to represent the GB economy covering all sectors. BRES data are not only used to produce employee and employment statistics but also to update the Inter Departmental Business Register (IDBR), which is the main sampling frame used for all ONS business surveys.

One of the strengths of BRES is that estimates are provided at detailed geographical and industrial levels (down to a lower super output geography at a 5-digit Standard Industrial Classification (SIC)). No other ONS employment survey output provides such information at these low levels and this enables a detailed analysis of employment at low level geographies and industries.

It should be noted BRES is a sample survey and produces estimated employment figures. These estimates are of a good quality at higher levels of geography (for example region). The quality of the estimates deteriorates as the geographies get smaller and this should be taken into account when considering the quality of sub-national estimates.

Both BRES and the Annual Business Inquiry part 1 (ABI/1)[6] employee estimates, which it replaced in 2009, are point-in-time snapshots of the GB/UK economy and are not designed to be used as time series figures, although it is recognised that users do use them in this manner. Both the BRES and ABI/1 estimates are subject to discontinuities caused by Standard Industrial Classification change, reference date change and source data change, potentially making any time series analysis difficult.

Publication on the National Statistics website

BRES figures published on the ONS website are released within a Statistical Bulletin along with a number of detailed supplementary tables. The levels at which the estimates are published are indicated by a tick in table 1 below. Most published estimates have a quality measure attached and all figures on the ONS website are subject to standard ONS disclosure rules.

Table 1: The levels at which BRES estimates are published on the ONS website

Geography/Industry	5-digit SIC*	BIG**	Overall Totals
UK /GB inc private / public sector splits	√	√	√
Region inc private / public sector splits		√	√
Local Authorities (county/metropolitan) inc private / public sector splits			√

*SIC: Standard Industrial Classification

**BIG: Broad Industrial grouping

Publication on the National On-line Manpower Information Service (NOMIS ®)

BRES publishes GB based estimates on NOMIS ®. Estimates obtained through NOMIS ® are potentially disclosive aggregate estimates down to a Lower Super Output Area (LSOA) geography at a 5-digit UK Standard Industrial Classification 2007 (SIC 2007)[7]. Access to these BRES estimates is only possible via the purchase of a Chancellor of the Exchequer's Notice which contains an

associated Data Access Agreement (DAA). The purchase of a Notice requires users to abide by the terms of the DAA.

BRES also publishes estimates by two employment sizebands:
- Workplace based employee/employment sizeband estimates at micro (0-9), small (10-49), medium (50-249) and large (250+) employment sizebands; and
- Enterprise based employee/employment sizeband estimates at micro (0-9), small (10-49), medium (50-249) and large (250+) employment sizebands and further disaggregations.

Access to these sizeband estimates is also only available via the purchase of a Chancellor of the Exchequer's Notice and the associated DAA.

In addition, BRES publishes a higher level free-to-view dataset on NOMIS. This dataset provides public/private based employee/employment estimates at a country, region LA district, LA county and Local Enterprise Partnership (LEP) geography. This free-to-view public/private dataset does not require the purchase of a Chancellor of the Exchequers Notice to access.

Table 2: Key points of the BRES and BRES methodology

	BRES
What it publishes	On the ONS website: The number of employees/employment in the United Kingdom on a public/private and full-time/part-time basis. Results are available at GB 5-digit (UK 3-digit) SIC 2007 level and Local Authority County total. On NOMIS ®: The number of employees/employment in the GB economy on a full-time/part-time basis down to a 5-digit SIC and LSOA geography level. Employee/employment estimates by workplace and enterprise level sizeband. Employee/employment estimates by public/private split.
Frequency	Annual.
Sample size	Approximately 80,000.
Periods available	From 2009.
Sample frame	Inter-Departmental Business Register.
Sample design	Stratified random sample where the strata are defined by SIC 2007, country, and employment size of a business.
Weighting	Each responding business represents a number of similar businesses from the IDBR, based on number of employees and the SIC 2007. The sampling weights are adjusted for non-response and births and deaths within the BRES business universe and are combined with calibration weights, based on IDBR employee counts, to produce overall weights. Calibration is carried out at enterprise level. Weights are calculated annually.
Estimation	Estimation is based on local unit returns: direct domain estimation is used for high levels of aggregation whereas minimum domain estimation is used for lower levels.
Outliers	Winsorisation is the outlier treatment method used, which requires specifying parameter values using past data which is updated regularly.
Part-time definition	For the purpose of the survey part-time is classed as 30 hours per week or less.

The BRES data and estimates are used widely, both within and outside government and are a vital source of business employee information. The key users and uses of the output include:

- **Eurostat** - BRES is a source of annual structural statistics for the Structural Business Statistics Regulation (SBSR), used for policy monitoring and formulation by the European Union (EU) via Eurostat[8];
- **The Scottish Government (SG) and the Welsh Government (WG)** - BRES provides estimates on employee numbers which are essential in the analysis of Scottish Government[9] and Welsh Government[10] employment trends. Estimates on all sectors are incorporated into the Scottish and Welsh figures and may also be used in internal briefings;
- **Department of Business, Innovation and Skills (BIS)** - the UK Department for Business, Innovation and Skills (BIS)[11] uses BRES estimates to assess the structure and performance of industries;
- **Workforce Jobs (WFJ)** - it is usual for the Workforce Jobs series, much of which is initially based on the Short Term Employment Survey's estimate of employee jobs, to be benchmarked to the BRES estimate. This benchmarking usually takes place in time for the December Labour Market Statistics First Release[12] in the following year;
- **Annual Business Survey (ABS)** - the ABS[13] collects financial data via the BRES questionnaire which are then matched to employment estimates to calculate turnover per head;
- **Local Government** - Local Government planning departments are major users of BRES using the estimates published on NOMIS[®] to forecast trends in employment in their specific areas and to claim for Central Government and European funding;
- **BRES** is one of the key data sources used to compile Nomenclature of Units for Territorial Statistics (NUTS) 2 and 3 Gross Value Added (GVA) data, with the NUTS2 data the key input to the allocation of EU structural funds to deprived regions of the EU; and
- **Additional** users include national government departments and bodies, businesses, academics and the general public. User groups are consulted to ensure that the data remain relevant to their needs.

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 following list shows the time lag between publication and the reference period to which the data refer. These timings are for the publication of the BRES estimates for the 2011 survey period.

1. Provisional National Results Release: 12 months after the reference period.
2. Revised National Results Release: 24 months after the reference period.

The time lag between publication and the period to which the data refer is considered the minimum required to produce estimates of a high enough quality to meet user needs taking into consideration:
- the amount of time it takes contributors to complete and return the BRES forms (as BRES asks for detailed local unit information, it can take contributors with a large number of local units a significant period of time to return all the completed forms);
- the large size of the BRES sample (some 80,000 contributors); and
- the validation and quality checking of the data and estimates prior to publication.

For more details on related releases, the UK National Statistics Publication Hub[14] 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[15].

BRES revisions policy

The BRES revisions policy states the following:

Following the initial publication of the data for year t in September of year t+1, the data will be revised and re-released in September of year t+2 (that is at the same time as the release of the provisional data for year t+1). The revisions will arise from a complete rerun of survey results, including re-weighting and taking on any new returned data. The complete revised dataset will be re-released as the final dataset. Proposed revisions outside of this regime will be logged by the results team and considered for release if appropriate.'

Revisions might also arise under other circumstances, for example, following a change in methodology or the introduction of a new Standard Industrial Classification (SIC). If so, these revised datasets will be re-released in a planned and coordinated way. Significant revisions will be explained to both internal and external users at the time of release, subject to the usual rules on confidentiality.

How the output is created

Coverage

BRES estimates cover UK businesses registered for Value Added Tax (VAT) and/or Pay As You Earn (PAYE) and are classified using the SIC 2007. It covers all major industry groups, such as production, construction, distribution, service trades and many more groups in SIC 2007.

BRES obtains the required details on these businesses from the IDBR, which is used as the survey sampling frame.

The sample does not cover Northern Ireland. Northern Ireland contributor data are supplied directly to ONS by the Department of finance and Personnel Northern Ireland (DFPNI). These data are added to the GB based tables produced by the BRES results system to produce UK based tables published on the ONS website. It should be noted that low level aggregate estimates published on NOMIS $^{®}$ cover GB only.

Likewise, the survey does not collect farm agriculture data. These data are supplied at an aggregated level by the [Department for Environment, Food and Rural Affairs (DEFRA)](#)[16], the Scottish Government, the Welsh Government and the [Department of Agriculture and Rural Development Northern Ireland (DARDNI)](#)[17]. This means it is only possible to include farms agriculture in the BRES estimates at the lowest aggregated level of geography supplied, which is a Region level. These data are added to the estimates after BRES estimation has been run and are then included in the aggregate estimates.

Sample design

The BRES sample currently contains around 80,000 businesses from across the Great Britain economy. The IDBR is used as the sampling frame from which a stratified random sample is drawn. The strata are defined by SIC 2007, by country and by employment size, with all employment sizes of businesses being covered. The design is a stratified one stage clustered sample, where the stage 1 units (or clusters) are enterprises, or RUs, and the elements in each cluster are local units.

- An enterprise can be defined as the smallest combination of legal units that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise may carry one or more activities at one or more locations. An enterprise may be a sole legal unit.
- A reporting unit (RU) is the unit used for collection of information through statistical surveys. In most instances it equates to the enterprise but for the more complex businesses it is part of an enterprise defined by a list of local units ('local unit list reporter').
- The local unit (LU) is an enterprise or part thereof (for example a workshop, factory, warehouse, office, mine or depot) situated in a geographically identified place. At or from this place, economic activity is carried out for which - save for certain exceptions - one or more persons work (even if only part-time) for one and the same enterprise.

If an enterprise is selected for BRES, then all its constituent local units are selected. Data are requested from each local unit. Broadly, the sample is stratified into: large or complex enterprises, unusual enterprises, and medium and small enterprises. Medium and small enterprises are further stratified by country (England, Scotland and Wales) and two-digit SIC 2007. The strata containing large or complex or unusual businesses and medium enterprises in Scotland and Wales are take-all strata.

Adjusting design weights to unit non-response and births and deaths

Unit non-response is addressed via re-weighting and the standard ONS method for births and deaths adjustment is used: both adjustments are carried out at either sampling stratum level or post-stratum level (see below). The adjusted design weight is given by

$$dweight = \frac{N}{n_r}\left(1 + \frac{n_d h_{bd}}{n_r - n_d}\right)$$

where N is the total number of enterprises in the universe in a given stratum, n_r is the number of responding enterprises, n_d is the number of dead enterprises among the respondents, and h_{bd} is the births-to-deaths ratio. The design weight is also referred to as the a-weight. In ONS, the birth-to-deaths ratio h_{bd} is set to 0 for businesses with a very large employment and 1 for other businesses. To implement this adjustment, ONS post-stratified the cells containing very large businesses (cells 1, 3 and 7) into two subcells each: a subcell for businesses with an employment equal to or exceeding a specified threshold and a subcell with employment below the threshold. The threshold has been set to 250. In the three subcells containing businesses whose employment equals or exceeds the threshold the births-to-deaths ratio has been set to 0; elsewhere this ratio has been set to 1.

Calibration

The adjusted design weights are calibrated with respect to total register employee counts. It is a two-way calibration with respect to industry classification (by section) and region (by region), and it is carried out at RU level. Two calibration, or model, groups are defined: one group for cells containing large businesses, and another group for the remainder of the cells. It is assumed that the variance of RU returns is proportional to the register employee counts. Within each calibration group, the adjusted design weights are calibrated so that, in each section and each region, the estimate of total register employee count is equal to the total register employee count. Because calibration is at RU level, there is no need to adjust for births and deaths of local units. This is dealt with directly at the estimation stage. The estimation tool used to compute the calibration weights is the Generalized Estimation System (GES).

Outlier treatment

The estimation for the survey variables in BRES is based on local unit returned values; the treatment of outliers is also applied at local unit level. Winsorisation is the outlier treatment method used; this requires obtaining predicted values for the local units with returns.

Winsorisation parameter values (often referred to as L-values) have been derived for all three survey variables: total employees, full-time employee and part-time employees. Once all three variables have been winsorised, the components (full-time and part-time) are scaled to add up to the winsorised total employee value.

Estimation

Estimation is based on local unit level returned data, which means domains are defined on the basis of local unit SIC and region. So, the estimate of the total of a given variable Y in domain D is given by

$$\hat{T}_{y,D} = \sum_{i \in s_r}\sum_{l \in D} a_i g_i \tilde{y}_{i,l}$$

where a_i and g_i are the adjusted design and g-weights for responding RU i, respectively, s_r is the set of responding RUs, and $\tilde{y}_{il}$ is the winsorised value of the return from local unit l in RU i.

Variance estimation

Standard errors and coefficients of variation for every specified domain are produced by the tool GES, apart from those below the minimum domain (see below).

Minimum domain methodology

Minimum domains are the lowest level at which direct estimates, that is those obtained by applying weights to the returned data, are considered robust. Although BRES collects data at the individual local unit level, it estimates employment for all non-sampled local units in the BRES business universe. The weighted employment less the returned employment is spread pro-rata across the non-surveyed units on the basis of their IDBR registered employment, while returned values are preserved, giving estimates with relatively low variance even at very detailed levels, but at the expense of introducing some bias. The current minimum domains are set at region geography and a combination of 2-digit and 3-digit SIC 2007 industry levels. The use of minimum domains provides good quality estimates at low level geographies, although this method means that accurate standard errors cannot be calculated for estimates below the minimum domain level.

The estimates produced by GES do not reflect the use of minimum domains and tend to be very large for low levels of aggregation. Approximate standard errors that take into account the minimum domain methodology but that ignore the bias introduced can be produced using the bootstrap method (re-sampling techniques for inferring the distribution of a statistic derived from a sample). The approach taken is to use GES for levels of aggregation at or above the minimum domains, overall and by public and private, and to use the bootstrap for levels below the minimum domains.

Statistical disclosure

BRES is conducted under the Statistics of Trade Act (STA) 1947. This Act imposes restrictions on the way that data collected during the survey may be used. The provisions of the STA are further regulated by the Employment and Training Act 1973 (ETA) as amended by the Employment Act 1989, which states that local planning authorities may use confidential data only for purposes that relate to development plans.

The main aim of these restrictions is to protect the identity of individual businesses, which have made statistical returns, from being disclosed or otherwise deduced. Some of the outputs have already been subjected to disclosure control and, therefore, the issue of confidentiality does not arise. However, employee information extracted by users of the NOMIS[®] database has not been suppressed and contains potentially disclosive cells.

Access to NOMIS[®] is restricted, by the provisions of the ETA 4(3) (f), to holders of Chancellor of the Exchequer's Notices. Users are required to agree a Data Access Agreement (DAA) and agree to be bound by the conditions contained within, in order to access the estimates.

Users of BRES estimates on NOMIS[®] are personally responsible for ensuring that any information which they publish or pass on to other users does not contain disclosive figures. More information is provided via the [BRES guide to use of potentially confidential data][18].

Validation and quality assurance
Accuracy
(The degree of closeness between an estimate and the true value.)

Estimates are subject to various sources of error. Total error consists of two elements, the sampling error and the non-sampling error. More detail on estimates and measures of these errors can be found via the [BRES][1] homepage. Quality measures are also published alongside all standard outputs on the ONS website, which provides useful information for the users on the quality of the data.

Sampling error

BRES is based on a sample survey estimating the number of employees, which gives rise to sampling error. The actual sampling error for any estimate is unknown but we can estimate, from the sample, a typical error, known as the standard error. This provides a means of assessing the accuracy of the estimate when an unbiased or approximately unbiased estimator is used. The lower the standard error, the more confident we can be that the estimate is close to the true value. The coefficient of variation (CV) can be calculated as the standard error divided by the estimate, and it is used to compare the relative accuracy across surveys or variables. The CV is one indicator of the quality of the estimate; the smaller the CV the higher the precision.

Quality measures are published alongside outputs, which will provide useful information for the users on the quality of the data. The CVs and standard errors are available at all geographies published on the BRES product page. The CVs and standard errors are calculated from current Geography[19] estimates.

Non-sampling error

Non-sampling error is not easy to quantify and includes errors of coverage, measurement, processing and non-response. Response rates give an indication of non-response bias in estimates when it can be assumed that the differences between responders and non-responders are the same regardless of response rates.

In seeking to maximise the accuracy of the survey estimates, the sample selection is carried out after the annual IDBR update processes are complete. This should minimise the selection of misclassified businesses and inadequate coverage of newly established businesses and defunct reporting units.

Various procedures are in place to ensure that errors are minimised. Year-on-year comparisons are made at respondent, local unit and aggregate level. Disparities are investigated to ensure consistent annual returns. Congruence checks are made against other surveys to ensure consistent values across industries from different surveys.

As BRES is used both to update the register and to produce estimates, there is a risk of feedback bias. To reduce this bias to a minimal level, the register employee count is modelled using survey data, and the modelled values are used in the auxiliary variable in calibration.

Another indicator of accuracy is reliability, which can be measured by assessing the difference between the first published estimate and the final revised figure. BRES adheres to a Revisions Policy whereby current survey estimates together with a revision of the previous year's survey estimates are published. Late returns or information received in the course of the following year's survey may lead to changes to the estimates after the provisional publication. Such changes are incorporated into the figures when the revised estimates are published in the following year (see BRES Revisions Policy above).

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.)

BRES replaced the ABI/1 employee survey. It represents a new methodology and change in data source when compared to the ABI/1, which had been published on a comparable basis since 1997. Any comparison to the ABI/1 estimates must be treated with caution. Work has been undertaken to identify and explain the reasons for, and impact of, any discontinuity and a paper relating to this can be found on both NOMIS [®] and the BRES product page. Scaling factors can be calculated by using the estimated BRES and ABI/1 2008 estimates to produce a time series on a consistent basis. Further details of the discontinuity analysis can be found on the BRES homepage.

Individual returns are classified using SIC 2007 in line with Eurostat guidelines. With regards to the ABI/1, data for 1997-2002 were collected under SIC 1992[20] and data from 2003 onwards collected under SIC 2003[21]. Both the 2007 and 2008 ABI/1 estimates were published on a SIC 2003 and SIC 2007 basis.

Users of BRES require that ONS employment statistics be coherent with each other; this is achieved by applying congruence checks between BRES and Monthly Business Survey (MBS) returns and using common methods where possible. As the BRES sample size is bigger than that of MBS, BRES outputs are more accurate and hence estimates from the Workforce Jobs Series are benchmarked to BRES estimates on an annual basis.

The Labour Force Survey (LFS)[22] is regarded by ONS as the best measure of total jobs in the economy. The BRES outputs are regarded as the best estimates at a detailed regional and industrial level. The main differences between them are:
- BRES is a point-in-time survey requesting employee counts on a specific date in the year. The LFS estimates are averages for three-month periods;
- the LFS definition of employment is anyone (aged 16 or over) who does at least one hour's paid

work in the week prior to their LFS interview, or has a job that they are temporarily away from (for example on holiday). On the other hand, BRES produces point-in-time estimates of full and part-time employees on the payroll;

- unlike BRES, LFS includes people who do unpaid work in a family business, Government Supported Trainees and HM Forces. It should be noted that this includes the self-employed as long as they are registered for VAT or PAYE. As the LFS includes these 'below the threshold' very small businesses employee estimates from LFS and BRES are not directly comparable; and

- LFS is a household survey while BRES is a survey of businesses. There is often a conflict between which industry people actually work in and which they think they work in, and LFS relies on respondents to self-classify to an industry. The answers that employees give in response to the LFS industry question may be influenced by the nature of their own job, which may not reflect the main activity of the organisation for which they work. As a result BRES figures give a more reliable industry breakdown than LFS.

BRES will also improve the timeliness of the employment data on the IDBR, through an increased sample size and improved design. This will improve the accuracy of all estimates produced from register-based surveys through increased accuracy of the auxiliary variable (for example, employment).

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

The BRES definition of an employee is anyone working on the BRES reference date who is aged 16 years or over that the contributor directly pays from its payroll(s), in return for carrying out a full-time or part-time job or being on a training scheme. Part-time workers are classed as those who work 30 hours per week or less.

This includes:
- all workers paid directly from the business's payroll(s);
- those temporarily absent but still being paid, for example on maternity leave;
- employees at sites where the planned activity is for less than one year; and
- employees at sites manned for less than 20 hours per week.

This excludes:
- any agency workers paid directly from the agency payroll;
- voluntary workers;
- former employees only receiving a pension;
- self-employed workers (not paid via the business's payroll(s)) where identified; and
- working owners who are not paid via PAYE.

Employment is obtained by adding the number of working owners to the number of employees. Working owners include sole traders, sole proprietors and partners who receive drawings and/or a share of profits, but are not paid via PAYE.

BRES also collects data to fulfil the UK's obligations under the Structural Business Statistics (SBS) Regulation of the European Union, established by the Council Regulation (EC, Euratom) No 58/97 of 20 December 1996. This established a common framework for the production of Community statistics on the structure, activity, competitiveness and performance of businesses in the Community. Data are transferred to Eurostat and used for policy monitoring and formulation by the EU, and as a source for annual structural statistics.

The figures are collected and presented by SIC 2007 in line with Eurostat guidelines.

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

BRES provisional national results are published 12 months after the reference period. The time lag between publication and the period to which the data refer is the minimum required to produce estimates of a high enough quality to meet all user needs. These results are revised 24 months after the reference period and can be considered more reliable in that they include late responder data and/or the correction of data errors that were not identified in time for the provisional release.

Further information on release dates and the BRES revisions policy are contained in the Timeliness and punctuality section of this paper.

Assessment of user needs and perceptions
(The processes for finding out about users and uses, and their views on the statistical products.)

A number of forums exist to obtain user views and the uses to which BRES data is put. The BRES User Group (BUG) comprises delegates selected from government bodies who have been identified as key users of the BRES estimates.

Information on how BRES data is used as well as users experience of the service provided is obtained in a number of ways, such as:
- information obtained from NOMIS [®] regarding who requests access to BRES data, and their reasons for wanting this access;
- internet based research looking at what uses are made of the BRES tables published on the ONS website;
- regular consultation with users in Local Government via the [Central & Local Government Intelligence Partnership (CLiP)][23];
- frequent ad hoc meetings with Welsh and Scottish Governments;
- during the development of the BRES, a web consultation exercise was undertaken inviting users of annual employment estimates (which at the time was from the Annual Business Inquiry) to provide their views and comments. These comments were used in developing BRES to ensure user needs were met. A paper was published summarising the views of users in response to this open consultation. A copy of both the consultation document and response can be found on the NS website: [Business Register and Employment Survey for Users][24]; and
- placing a voluntary questionnaire on the BRES ONS web page asking those using the site information regarding their use of the BRES data.

An analysis of BRES users who apply for a Chancellor's Notice to access BRES employee estimates on NOMIS [®] was used to ascertain the main users of BRES and can be found in table 3. This shows that around half of the users who held a Notice to access the 2011 BRES estimates were from central and local government, with commercial organisations also making up a significant percentage at 31%.

Table 3: Main users of BRES estimates on NOMIS [®]

Description	Areas selected	percentage
Central/Local Government and NHS	11,300	50
Commercial	7,000	31
Not-for-profit Organisation	1,800	8
University	1,100	5
Training Body	600	3
Personal	200	1
School / College	100	0
Total	**22,400**	**100**

Please note the above figures are subject to rounding and therefore figures by type of user may not add up to the overall totals.

There are a number of plans to further ONS's knowledge of the uses of BRES and who uses it. These include:
- expanding the BRES user group by using responses to the voluntary web questionnaire to see if there are any key users of BRES that might be interested in attending the user group;
- review annually the usage made of the BRES data from NOMIS [®]; and
- consulting local government users regarding the specific uses made of the BRES statistics.

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.)

ONS's 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. The ONS 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 the ONS website but not produced by the ONS, or referenced on the ONS website but stored elsewhere, may vary. For further information please refer to the contact details at the beginning of this document.
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For information regarding conditions of access to data, please refer to the links below:

- Terms and conditions (for data on the website)[25];
- Copyright and reuse of published data[26];
- Pre-release access (including conditions of access)[27]; and
- Accessibility[28].

In addition to this Quality and Methodology Information, Basic Quality Information relevant to each release is available in the background notes of the relevant Statistical Bulletin[29].

References

	Title of Reference	Website Location
1	Business Register Employment Survey (BRES)	http://www.ons.gov.uk/ons/guide-method/method-quality/specific/labour-market/business-register-and-employment-survey--bres-/index.html
2	Office for National Statistics (ONS) website	http://www.statistics.gov.uk/default.asp
3	National On-line Manpower Information service (NOMIS ®)	http://www.NOMIS ®web.co.uk
4	Guidelines for Measuring Statistical Quality	http://www.ons.gov.uk/ons/guide-method/method-quality/quality/guidelines-for-measuring-statistical-quality/index.html
5	Department of Finance and Personnel Northern Ireland (DFPNI)	http://www.dfpni.gov.uk/index.htm
6	Annual Business Inquiry part 1	http://www.ons.gov.uk/ons/rel/abs/annual-business-inquiry/index.html
7	SIC 2007	UK Standard Industrial Classification 2007 (UK SIC 2007)
8	Eurostat	http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home
8	Scottish Government	http://www.scotland.gov.uk
10	Welsh Government	http://wales.gov.uk/?lang=en
11	Department for Business, Innovation and Skills	http://www.bis.gov.uk/
12	Labour Market Statistics First Release	http://www.ons.gov.uk/ons/search/index.html?pageSize=50&newquery=Labour+Market+Statistics+first+release
13	Annual Business Survey (ABS)	http://www.ons.gov.uk/ons/guide-method/method-quality/specific/business-and-energy/annual-business-survey/index.html

14	UK National Statistics Publication Hub	http://www.statistics.gov.uk/hub/release-calendar/index.html
15	Code of Practise for Official Statistics	http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html
16	Department for Environment, Food and Rural Affairs (DEFRA)	http://ww2.defra.gov.uk/
17	Department of Agriculture and Rural Development Northern Ireland (DARDNI)	http://www.dardni.gov.uk/
18	BRES Guide to Use of Potentially Confidential Data	https://www.nomisweb.co.uk/notices/docs/infoguide.pdf
19	Guide to Geographies	http://www.ons.gov.uk/ons/guide-method/geography/ons-geography/index.html
20	SIC 1992	http://www.ons.gov.uk/ons/guide-method/classifications/archived-standard-classifications/uk-standard-industrial-classification-1992--sic92-/index.html
21	SIC 2003	http://www.ons.gov.uk/ons/guide-method/classifications/archived-standard-classifications/uk-standard-industrial-classification-1992--sic92-/index.html
22	Labour Force Survey	http://www.ons.gov.uk/ons/guide-method/method-quality/specific/labour-market/labour-market-statistics/index.html
23	Central and Local Government Information Partnership (CLiP)	http://www.clip.local.gov.uk/lgv/core/page.do?pageId=1
24	Business Register and Employment Survey for Users	http://www.ons.gov.uk/ons/about-ons/user-engagement/consultations-and-surveys/archived-consultations/2006/business-register-and-employment-survey-for-businesses/index.html
25	Terms and conditions (for data on the website)	http://www.ons.gov.uk/ons/site-information/information/terms-and-conditions/index.html
26	Copyright and reuse of published data	http://www.ons.gov.uk/ons/site-information/information/creative-commons-license/index.html
27	Pre-release access (including conditions of access)	http://www.ons.gov.uk/ons/guide-method/the-national-statistics-standard/code-of-practice/pre-release-access/index.html
28	Accessibility	http://www.ons.gov.uk/ons/site-information/information/accessibility/index.html
29	2012 BRES Statistical Bulletin	Business Register and Employment Survey, 2012 - ONS

Information paper

Quality and Methodology Information

General details

Title of output: Business Register and Employment Survey
Abbreviated title: BRES
Designation: National Statistic
Geographic coverage: United Kingdom (UK), Great Britain (GB), Region, Local Authority
                        County/District
Date of last SQR or QMI[*]: February 2013
Contact details: BRES@ONS.gov.uk

Executive summary

The Business Register and Employment Survey (BRES)[1] publishes employee and employment estimates at detailed geographical and industrial levels. It collects comprehensive employment information from businesses in England, Scotland and Wales, representing the majority of the Great Britain (GB) economy. Independently collected Northern Ireland data are then combined to produce estimates on a United Kingdom (UK) basis. High level estimates are published on the Office for National Statistics (ONS) website[2] and more detailed estimates are published on the National On-line Manpower Information Service (NOMIS)[®3] website. BRES is regarded as the definitive source of official government employee statistics by industry.

This document contains the following sections:

* Output quality;
* About the output;
* How the output is created;
* Validation and quality assurance;
* Concepts and definitions;
* Other information, relating to quality trade-offs and user needs; and
* Sources for further information or advice.

Output quality

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

ONS has developed Guidelines for Measuring Statistical Quality[4]; these are based upon the five 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; and
* Accessibility and clarity.

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[*] Quality and Methodology Information' (QMI) replaced 'Summary Quality Reports' (SQR) from 04/11

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

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

BRES publishes employee and employment estimates at detailed geographical and industrial levels. It collects comprehensive employment information from businesses in England, Scotland and Wales representing the majority of the GB economy. [The Department of Finance and Personnel Northern Ireland (DFPNI)](5), collects the same BRES information independently in Northern Ireland. Both data sources are then combined to produce estimates on a UK basis. BRES is regarded as the definitive source of official government employee and employment statistics by industry. Employment is obtained by adding the number of working owners to the number of employees employed by a business, where working owners include sole traders, sole proprietors and partners who receive drawings and/or a share of profits, but are not paid via PAYE.

In terms of data, the survey sample of approximately 80,000 businesses is weighted up to represent the GB economy covering all sectors. BRES data are not only used to produce employee and employment statistics but also to update the Inter Departmental Business Register (IDBR), which is the main sampling frame used for most ONS business surveys.

One of the strengths of BRES is that estimates are provided at detailed geographical and industrial levels (down to a lower super output geography at a five-digit Standard Industrial Classification (SIC)). No other ONS employment survey output provides such information at these low levels and this enables a detailed analysis of employment at low level geographies and industries.

It should be noted BRES is a sample survey and produces estimated employment figures. These estimates are of a good quality at higher levels of geography (for example region). The quality of the estimates deteriorates as the geographies get smaller and this should be taken into account when considering the quality of sub-national estimates.

BRES is a point-in-time snapshot of the GB/UK economy and is not designed to be used as a time series, although it is recognised that users do use them in this manner. BRES is subject to discontinuities caused by Standard Industrial Classification change, reference date change and source data change, potentially making any time series analysis difficult.

Publication on the National Statistics website

BRES figures published on the ONS website are released within a statistical bulletin along with a number of detailed supplementary tables. The levels at which the estimates are published are indicated by a tick in table 1 below. Most published estimates have a quality measure attached and all figures on the ONS website are subject to standard ONS disclosure rules.

Table 1: The levels at which BRES estimates are published on the ONS website

Geography/Industry	Five-digit SIC[*]	BIG[**]	Overall Totals
UK /GB inc private / public sector splits	√	√	√
Region inc private / public sector splits		√	√
Local Authorities (district/county/metropolitan) inc private / public sector splits			√

[*]SIC: Standard Industrial Classification

[**]BIG: Broad Industrial grouping

Publication on the National On-line Manpower Information Service (NOMIS [®])

BRES publishes GB based estimates on NOMIS [®]. Estimates that can be obtained through NOMIS [®] are potentially disclosive aggregate estimates down to a Lower Super Output Area (LSOA) geography at a five-digit [UK Standard Industrial Classification 2007 (SIC 2007)](6). Access to these BRES estimates is only possible via the acquisition of a Chancellor of the Exchequer's Notice which

contains an associated Data Access Agreement (DAA). The acquisition of a Notice requires users to abide by the terms of the DAA. There is currently no financial cost for obtaining a Chancellor of the Exchequer's Notice.

In addition, BRES publishes a higher level open access dataset on NOMIS ®. This dataset provides public/private based employee/employment estimates at a country, region, LA county, LA district and Local Enterprise Partnership (LEP) geography. This open access public/private dataset does not require the acquisition of a Chancellor of the Exchequer's Notice.

Table 2: Key points of the BRES and BRES methodology

	BRES
What it publishes	On the ONS website: the number of employees/employment in the United Kingdom on a public/private and full-time/part-time basis. Results are available at GB five-digit (UK three-digit) SIC 2007 level and Local Authority District and County total. On NOMIS ®: the number of employees/employment in the GB economy on a full-time/part-time basis down to a five-digit SIC and LSOA geography level. Employee/employment estimates by public/private split.
Frequency	Annual.
Sample size	Approximately 80,000.
Periods available	From 2009.
Sample frame	IDBR.
Sample design	Stratified random sample where the strata are defined by SIC 2007, country, and employment size of a business.
Weighting	Each responding business represents a number of similar businesses from the IDBR, based on number of employees and the SIC 2007. The sampling weights are adjusted for non-response and births and deaths within the BRES business universe and are combined with calibration weights, based on IDBR employee counts, to produce overall weights. Calibration is carried out at enterprise level. Weights are calculated annually.
Estimation	Estimation is based on local unit returns: direct domain estimation is used for high levels of aggregation whereas minimum domain estimation is used for lower levels.
Outliers	Winsorisation is the outlier treatment method used, which requires specifying parameter values using past data which is updated regularly.
Part-time definition	For the purpose of the survey, part-time is classed as 30 hours per week or less.

The BRES data and estimates are used widely, both within and outside government and are a vital source of business employee information. The key users and uses of the output include:

- **Eurostat** - BRES is a source of annual structural statistics for the Structural Business Statistics Regulation (SBSR), used for policy monitoring and formulation by the European Union (EU) via Eurostat[7];
- **the Scottish Government (SG) and the Welsh Government (WG)** - BRES provides estimates on employee numbers which are essential in the analysis of Scottish Government[8] and Welsh Government[9] employment trends. Estimates on all sectors are incorporated into the Scottish and Welsh figures and may also be used in internal briefings;
- **Department of Business, Innovation and Skills (BIS)** - the UK Department for Business, Innovation and Skills (BIS)[10] uses BRES estimates to assess the structure and performance of industries;
- **Workforce Jobs** - it is usual for the Workforce Jobs series (WFJ), much of which is initially based on the Short Term Employment Survey's estimate of employee jobs, to be benchmarked to the BRES estimate. This benchmarking usually takes place in time for the December Labour Market Statistics First Release[11] in the following year;
- **Annual Business Survey (ABS)** - the ABS[12] collects financial data via the BRES questionnaire, which are then matched to employment estimates to calculate turnover per head;

- **Local Government** - Local Government planning departments are major users of BRES using the estimates published on NOMIS $^®$ to forecast trends in employment in their specific areas and to claim for Central Government and European funding;
- **BRES** is one of the key data sources used to compile Nomenclature of Units for Territorial Statistics (NUTS) 2 and 3 Gross Value Added (GVA) data, with the NUTS2 data the key input to the allocation of EU structural funds to deprived regions of the EU; and
- **Additional** users include national government departments and bodies, businesses, academics and the general public. User groups are consulted to ensure that the data remain relevant to their needs.

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 following list shows the time lag between publication and the reference period to which the data refer. These timings are for the publication of the BRES estimates for the 2011 survey period.

1. Provisional National Results Release: 12 months after the reference period.
2. Revised National Results Release: 24 months after the reference period.

The time lag between publication and the period to which the data refer is considered the minimum required to produce estimates of a high enough quality to meet user needs taking into consideration:

- the amount of time it takes contributors to complete and return the BRES forms (as BRES asks for detailed local unit information it can take contributors with a large number of local units a significant period of time to return all the completed forms);
- the large size of the BRES sample (some 80,000 contributors); and
- the validation and quality checking of the data and estimates prior to publication.

BRES revisions policy

The BRES revisions policy states the following:

Following the initial publication of the data for year t in September of year t+1, the data will be revised and re-released in September of year t+2 (that is at the same time as the release of the provisional data for year t+1). The revisions will arise from a complete rerun of survey results, including re-weighting and taking on any new returned data. The complete revised dataset will be re-released as the final dataset. Proposed revisions outside of this regime will be logged by the results team and considered for release if appropriate.

Revisions might also arise under other circumstances, for example, following a change in methodology or the introduction of a new SIC. If so, these revised datasets will be re-released in a planned and coordinated way. Significant revisions will be explained to both internal and external users at the time of release, subject to the usual rules on confidentiality.

For more details on related releases, the UK National Statistics Publication Hub[13] 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[14].

How the output is created

Coverage

BRES estimates cover UK businesses registered for Value Added Tax (VAT) and/or Pay as You Earn (PAYE) and are classified using the SIC 2007. It covers all major industry groups, such as production, construction, distribution, service trades and many more groups in SIC 2007.

BRES obtains the required details on these businesses from the IDBR, which is used as the survey sampling frame.

The sample does not cover Northern Ireland. Northern Ireland contributor data are supplied directly to ONS by DEPNI. These data are added to the GB based tables produced by the BRES results

system to produce UK based tables published on the ONS website. It should be noted that low level aggregate estimates published on NOMIS[®] cover GB only.

Likewise, the survey does not collect farm agriculture data. These data are supplied at an aggregated level by the [Department for Environment, Food and Rural Affairs (DEFRA)][15], the Scottish Government, the Welsh Government and the [Department of Agriculture and Rural Development Northern Ireland (DARDNI)][16]. This means it is only possible to include farms agriculture in the BRES estimates at the lowest aggregated level of geography supplied, which is a Region level. These data are added to the estimates after BRES estimation has been run and are then included in the aggregate estimates.

Sample design

The BRES sample currently contains around 80,000 businesses from across the Great Britain economy. The IDBR is used as the sampling frame from which a stratified random sample is drawn. The strata are defined by SIC 2007, by country and by employment size, with all employment sizes of businesses being covered. The design is a stratified one stage clustered sample, where the stage 1 units (or clusters) are enterprises, or RUs, and the elements in each cluster are local units.

- An enterprise can be defined as the smallest combination of legal units that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise may carry one or more activities at one or more locations. An enterprise may be a sole legal unit.
- A reporting unit (RU) is the unit used for collection of information through statistical surveys. In most instances it equates to the enterprise but for the more complex businesses it is part of an enterprise defined by a list of local units (LU) ('local unit list reporter').
- The LU is an enterprise or part thereof (e.g. a workshop, factory, warehouse, office, mine or depot) situated in a geographically identified place. At or from this place economic activity is carried out for which, save for certain exceptions, one or more persons work (even if only part-time) for one and the same enterprise.

If an enterprise is selected for BRES, then all its constituent local units are selected. Data are requested from each local unit. Broadly, the sample is stratified into: large or complex enterprises, unusual enterprises, and medium and small enterprises. Medium and small enterprises are further stratified by country (England, Scotland and Wales) and two-digit SIC 2007. The strata containing large or complex or unusual businesses and medium enterprises in Scotland and Wales are take-all strata.

Adjusting design weights to unit non-response and births and deaths

Unit non-response is addressed via re-weighting and the standard ONS method for births and deaths adjustment is used: both adjustments are carried out at either sampling stratum level or post-stratum level (see below). The adjusted design weight is given by:

$$dweight = \frac{N}{n_r}\left(1 + \frac{n_d h_{bd}}{n_r - n_d}\right)$$

where N is the total number of enterprises in the universe in a given stratum, n_r is the number of responding enterprises, n_d is the number of dead enterprises among the respondents, and h_{bd} is the births-to-deaths ratio. The design weight is also referred to as the a-weight. In ONS, the birth-to-deaths ratio h_{bd} is set to 0 for businesses with a very large employment and 1 for other businesses. To implement this adjustment, ONS post-stratified the cells containing very large businesses (cells 1, 3 and 7) into two subcells each: a subcell for businesses with an employment equal to or exceeding a specified threshold and a subcell with employment below the threshold. The threshold has been set to 250. In the three subcells containing businesses whose employment equals or exceeds the threshold the births-to-deaths ratio has been set to 0; elsewhere this ratio has been set to 1.

Calibration

The adjusted design weights are calibrated with respect to total register employee counts. It is a two-way calibration with respect to industry classification (by section) and region (by region), and it is carried out at RU level. Two calibration, or model, groups are defined: one group for cells containing large businesses, and another group for the remainder of the cells. It is assumed that the variance of RU returns is proportional to the register employee counts. Within each calibration group, the adjusted design weights are calibrated so that, in each section and each region, the estimate of total register employee count is equal to the total register employee count. Because calibration is at RU level, there is no need to adjust for births and deaths of local units. This is dealt with directly at the estimation stage. The estimation tool used to compute the calibration weights is the Generalized Estimation System (GES).

Outlier treatment

The estimation for the survey variables in BRES is based on local unit returned values; the treatment of outliers is also applied at local unit level. Winsorisation is the outlier treatment method used; this requires obtaining predicted values for the local units with returns.

Winsorisation parameter values (often referred to as L-values) have been derived for all three survey variables: total employees, full-time employee and part-time employees. Once all three variables have been winsorised, the components (full-time and part-time) are scaled to add up to the winsorised total employee value.

Estimation

Estimation is based on local unit level returned data, which means domains are defined on the basis of local unit SIC and region. So, the estimate of the total of a given variable Y in domain D is given by:

$$\hat{T}_{y,D} = \sum_{i \in s_r} \sum_{l \in D} a_i g_i \tilde{y}_{i,l}$$

where a_i and g_i are the adjusted design and g-weights for responding RU i, respectively, s_r is the set of responding RUs, and $\tilde{y}_{il}$ is the winsorised value of the return from local unit l in RU i.

Variance estimation

Standard errors and coefficients of variation for every specified domain are produced by the tool GES, apart from those below the minimum domain (see below).

Minimum domain methodology

Minimum domains are the lowest level at which direct estimates, ie those obtained by applying weights to the returned data, are considered robust. Although BRES collects data at the individual local unit level, it estimates employment for all non-sampled local units in the BRES business universe. The weighted employment less the returned employment is spread pro-rata across the non-surveyed units on the basis of their IDBR registered employment, while returned values are preserved, giving estimates with relatively low variance even at very detailed levels, but at the expense of introducing some bias. The current minimum domains are set at region geography and a combination of two-digit and three-digit SIC 2007 industry levels. The use of minimum domains provides good quality estimates at low level geographies, although this method means that accurate standard errors cannot be calculated for estimates below the minimum domain level.

The estimates produced by GES do not reflect the use of minimum domains and tend to be very large for low levels of aggregation. Approximate standard errors that take into account the minimum domain methodology but that ignore the bias introduced can be produced using the bootstrap method (re-sampling techniques for inferring the distribution of a statistic derived from a sample). The approach taken is to use GES for levels of aggregation at or above the minimum domains, overall and by public and private, and to use the bootstrap for levels below the minimum domains.

Statistical disclosure

BRES is conducted under the Statistics of Trade Act (STA) 1947. This Act imposes restrictions on the way that data collected during the survey may be used. The provisions of the STA are further regulated by the Employment and Training Act 1973 (ETA) as amended by the Employment Act 1989, which states that local planning authorities may use confidential data only for purposes that relate to development plans.

The main aim of these restrictions is to protect the identity of individual businesses, which have made statistical returns, from being disclosed or otherwise deduced. Some of the outputs have already been subjected to disclosure control and, therefore, the issue of confidentiality does not arise. However, employee information extracted by users of the NOMIS ® database has not been suppressed and contains potentially disclosive cells.

Access to NOMIS ® is restricted, by the provisions of the ETA 4(3) (f), to holders of Chancellor of the Exchequer's Notices. Users are required to agree a DAA and agree to be bound by the conditions contained within, in order to access the estimates.

Users of BRES estimates on NOMIS ® are personally responsible for ensuring that any information which they publish or pass on to other users does not contain disclosive figures. More information is provided via the BRES guide to use of potentially confidential data[17].

Validation and quality assurance
Accuracy
(The degree of closeness between an estimate and the true value.)

Estimates are subject to various sources of error. Total error consists of two elements, the sampling error and the non-sampling error. More detail on estimates and measures of these errors can be found via the BRES[1] homepage. Quality measures are also published alongside all standard outputs on the ONS website, which provides useful information for the users on the quality of the data.

Sampling error

BRES is based on a sample survey estimating the number of employees, which gives rise to sampling error. The actual sampling error for any estimate is unknown but we can estimate, from the sample, a typical error, known as the standard error. This provides a means of assessing the accuracy of the estimate when an unbiased or approximately unbiased estimator is used. The lower the standard error, the more confident we can be that the estimate is close to the true value. The coefficient of variation (CV) can be calculated as the standard error divided by the estimate, and it is used to compare the relative accuracy across surveys or variables. The CV is one indicator of the quality of the estimate; the smaller the CV the higher the precision.

Quality measures are published alongside outputs, which will provide useful information for the users on the quality of the data. The CVs and standard errors are available at all geographies published on the BRES[1] product page. The CVs and standard errors are calculated from current Geography[18] estimates.

Non-sampling error

Non-sampling error is not easy to quantify and include errors of coverage, measurement, processing and non-response. Response rates give an indication of non-response bias in estimates when it can be assumed that the differences between responders and non-responders are the same regardless of response rates.

In seeking to maximise the accuracy of the survey estimates, the sample selection is carried out after the annual IDBR update processes are complete. This should minimise the selection of misclassified businesses and inadequate coverage of newly established businesses and defunct reporting units.

Various procedures are in place to ensure that errors are minimised. Year-on-year comparisons are made at respondent, local unit and aggregate level. Disparities are investigated to ensure the consistent annual returns. Congruence checks are made against other surveys to ensure consistent values across industries from different surveys.

As BRES is used both to update the register and to produce estimates, there is a risk of feedback bias. To reduce this bias to a minimal level, the register employee count is modelled using survey data, and the modelled values are used in the auxiliary variable in calibration.

Another indicator of accuracy is reliability, which can be measured by assessing the difference between the first published estimate and the final revised figure. BRES adheres to a Revisions Policy whereby current survey estimates together with a revision of the previous year's survey estimates are published. Late returns or information received in the course of the following year's survey may lead to changes to the estimates after the provisional publication. Such changes are incorporated into the figures when the revised estimates are published in the following year (see BRES Revisions Policy above).

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.)

BRES replaced the ABI/1 employee survey. It represents a change in methodology and data source when compared to the ABI/1, which had been published on a comparable basis since 1997. Any comparison to the ABI/1 estimates must be treated with caution. Work has been undertaken to identify and explain the reasons for, and impact of, any discontinuity and a paper relating to this can be found on both NOMIS ® and the BRES product page. Scaling factors can be calculated by using the estimated BRES and ABI/1 2008 estimates to produce a time series on a consistent basis. Further details of the discontinuity analysis can be found on the BRES homepage.

Individual returns are classified using SIC 2007 in line with Eurostat guidelines. With regards to the ABI/1, data for 1997 – 2002 were collected under SIC 1992[19] and data from 2003 onwards collected under SIC 2003[20]. Both the 2007 and 2008 ABI/1 estimates were published on a SIC 2003 and SIC 2007 basis.

Users of BRES require that ONS employment statistics be coherent with each other; this is achieved by applying congruence checks between BRES and Monthly Business Survey (MBS) returns and using common methods where possible. As the BRES sample size is bigger than that of MBS, BRES outputs are more accurate and hence estimates from the Workforce Jobs Series are benchmarked to BRES estimates on an annual basis.

The Labour Force Survey (LFS)[21] is regarded by ONS as the best measure of total jobs in the economy. The BRES outputs are regarded as the best estimates at a detailed regional and industrial level. The main differences between them are:

- BRES is a point-in-time survey requesting employee counts on a specific date in the year. The LFS estimates are averages for three-month periods;
- the LFS definition of employment is anyone (aged 16 or over) who does at least one hour's paid work in the week prior to their LFS interview, or has a job that they are temporarily away from (for example on holiday). On the other hand, BRES produces point-in-time estimates of full and part-time employees on the payroll;
- unlike BRES, LFS includes people who do unpaid work in a family business, Government Supported Trainees and HM Forces. It should be noted that includes the self-employed as long as they are registered for VAT or PAYE. As the LFS includes these 'below the threshold' very small businesses employee estimates from LFS and BRES are not directly comparable; and
- LFS is a household survey while BRES is a survey of businesses. There is often a conflict between which industry people actually work in and which they think they work in, and LFS relies on respondents to self-classify to an industry. The answers that employees give in response to the LFS industry question may be influenced by the nature of their own job, which may not reflect the main activity of the organisation for which they work. As a result BRES figures give a more reliable industry breakdown than LFS.

BRES also improves the timeliness of the employment data on the IDBR through an increased sample size and improved design. This improves the accuracy of all estimates produced from register-based surveys through increased accuracy of the auxiliary variable (for example, employment).

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

The BRES definition of an employee is anyone working on the BRES reference date who is aged 16 years or over that the contributor directly pays from its payroll(s), in return for carrying out a full-time or part-time job or being on a training scheme. Part-time workers are classed as those who work 30 hours per week or less.

This includes:

- all workers paid directly from the business's payroll(s);
- those temporarily absent but still being paid, for example on maternity leave;
- employees at sites where the planned activity is for less than one year; and
- employees at sites manned for less than 20 hours per week.

This excludes:

- any agency workers paid directly from the agency payroll;
- voluntary workers;
- former employees only receiving a pension;
- self-employed workers (not paid via the business's payroll(s)) where identified; and
- working owners who are not paid via PAYE.

Employment is obtained by adding the number of working owners to the number of employees. Working owners include sole traders, sole proprietors and partners who receive drawings and/or a share of profits, but are not paid via PAYE.

BRES also collects data to fulfil the UK's obligations under the Structural Business Statistics (SBS) Regulation of the European Union, established by the Council Regulation (EC, Euratom) No 58/97 of 20 December 1996. This established a common framework for the production of Community statistics on the structure, activity, competitiveness and performance of businesses in the Community. Data are transferred to Eurostat and used for policy monitoring and formulation by the EU, and as a source for annual structural statistics.

The figures are collected and presented using SIC 2007 in line with Eurostat guidelines.

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

BRES provisional national results are published 12 months after the reference period. The time lag between publication and the period to which the data refer is the minimum required to produce estimates of a high enough quality to meet all user needs. These results are revised 24 months after the reference period and can be considered more reliable in that they include late responder data and/or the correction of data errors that were not identified in time for the provisional release.

Further information on release dates and the BRES revisions policy are contained in the Timeliness and punctuality section of this paper.

Assessment of user needs and perceptions
(The processes for finding out about uses and users, and their views on the statistical products.)

A number of forums exist to obtain user views and the uses to which BRES data is put. The BRES User Group (BUG) comprises delegates selected from government bodies who have been identified as key users of the BRES estimates.

Information on how BRES data is used as well as users' experience of the service provided is obtained in a number of ways, such as:

- information obtained from NOMIS [®] regarding who requests access to BRES data, and their reasons for wanting this access;
- internet based research looking at what uses are made of the BRES tables published on the ONS website;

- regular consultation with users in Local Government via the [Central Local Information Partnership](#)[22];
- frequent ad hoc meetings with Welsh and Scottish Governments;
- during the development of the BRES a web consultation exercise was undertaken inviting users of annual employment estimates (which at the time was from the Annual Business Inquiry) to provide their views and comments. These comments were used in developing BRES to ensure user needs were met. A paper was published summarising the views of users in response to this open consultation. A copy of both the consultation document and response can be found on the NS website: [Business Register and Employment Survey for Users](#)[23];
- placing a voluntary questionnaire on the BRES ONS web page asking those using the site information regarding their use of the BRES data; and
- feedback and questions posted on the RSS's [StatsUserNet](#)[24] website.

An analysis of BRES users who apply for a Chancellor's Notice to access BRES employee estimates on NOMIS[®] was used to ascertain the main users of BRES and can be found in table 3. This shows that around half of the users who held a Notice to access the 2011 BRES estimates were from central and local government, with commercial organisations also making up a significant percentage at 31%.

Table 3: Main users of BRES estimates on NOMIS[®]

Description	Areas selected	percentage
Central/Local Government and NHS	10,900	48
Commercial	8,700	38
Not-for-profit Organisation	1,300	6
University	1,200	5
Training Body	400	2
Personal	200	1
School / College	100	0
Total	22,800	100

There are a number of plans to further ONS's knowledge of the uses of BRES and who uses it. These include:

- expanding the BRES user group by using responses to the voluntary web questionnaire to see if there are any key users of BRES that might be interested in attending the user group;
- review annually the usage made of the BRES[2] data from NOMIS[®]; and
- consulting local government users regarding the specific uses made of the BRES statistics.

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.)

ONS's 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. The ONS 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 the ONS website but not produced by the ONS, or referenced on the ONS website but stored elsewhere, may vary. 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)](#)[25];
- [Copyright and reuse of published data](#)[26];
- [Pre-release access (including conditions of access)](#)[27]; and
- [Accessibility](#)[28].

In addition to this Quality and Methodology Information, Basic Quality Information relevant to each release is available in the background notes of the relevant Statistical Bulletin[29].

References

	Title of Reference	Website Location
1	Business Register Employment Survey (BRES)	http://www.ons.gov.uk/ons/guide-method/method-quality/specific/labour-market/business-register-and-employment-survey--bres-/index.html
2	Office for National Statistics (ONS) website	http://www.statistics.gov.uk/default.asp
3	National On-line Manpower Information service (NOMIS ®)	http://www.NOMIS ®web.co.uk
4	Guidelines for Measuring Statistical Quality	http://www.ons.gov.uk/ons/guide-method/method-quality/quality/guidelines-for-measuring-statistical-quality/index.html
5	Department of Finance and Personnel Northern Ireland (DFPNI)	http://www.dfpni.gov.uk/index.htm
6	SIC 2007	UK Standard Industrial Classification 2007 (UK SIC 2007)
7	Eurostat	http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home
8	Scottish Government	http://www.scotland.gov.uk
9	Welsh Government	http://wales.gov.uk/?lang=en
10	Department for Business, Innovation and Skills	http://www.bis.gov.uk/
11	Labour Market Statistics First Release	http://www.ons.gov.uk/ons/search/index.html?pageSize=50&newquery=Labour+Market+Statistics+first+release
12	Annual Business Survey (ABS)	http://www.ons.gov.uk/ons/guide-method/method-quality/specific/business-and-energy/annual-business-survey/index.html
13	UK National Statistics Publication Hub	https://www.gov.uk/government/statistics/announcements
14	Code of Practise for Official Statistics	http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html
15	Department for Environment, Food and Rural Affairs (DEFRA)	http://ww2.defra.gov.uk/
16	Department of Agriculture and Rural Development Northern Ireland (DARDNI)	http://www.dardni.gov.uk/
17	BRES Guide to Use of Potentially Confidential Data	https://www.nomisweb.co.uk/notices/docs/infoguide.pdf
18	Guide to Geographies	http://www.ons.gov.uk/ons/guide-method/geography/ons-geography/index.html
19	SIC 1992	http://www.ons.gov.uk/ons/guide-method/classifications/archived-standard-classifications/uk-standard-industrial-classification-1992--sic92-/index.html

20	SIC 2003	http://www.ons.gov.uk/ons/guide-method/classifications/archived-standard-classifications/uk-standard-industrial-classification-1992--sic92-/index.html
21	Labour Force Survey	http://www.ons.gov.uk/ons/guide-method/method-quality/specific/labour-market/labour-market-statistics/index.html
22	Central and Local Information Partnership (CLiP)	http://clip.local.gov.uk/lgv/core/page.do?pageId=1
23	Business Register and Employment Survey for Users	http://www.ons.gov.uk/ons/about-ons/user-engagement/consultations-and-surveys/archived-consultations/2006/business-register-and-employment-survey-for-businesses/index.html
24	StatsUserNet homepage	http://www.statsusernet.org.uk/home
25	Terms and conditions (for data on the website)	http://www.ons.gov.uk/ons/site-information/information/terms-and-conditions/index.html
26	Copyright and reuse of published data	http://www.ons.gov.uk/ons/site-information/information/creative-commons-license/index.html
27	Pre-release access (including conditions of access)	http://www.ons.gov.uk/ons/guide-method/the-national-statistics-standard/code-of-practice/pre-release-access/index.html
28	Accessibility	http://www.ons.gov.uk/ons/site-information/information/accessibility/index.html
29	2012 BRES Statistical Bulletin	Business Register and Employment Survey, 2012 - ONS

Information paper

Quality and Methodology Information

General details

Title of output: Business Register and Employment Survey
Abbreviated title: BRES
Designation: National Statistic
Geographic coverage: United Kingdom (UK), Great Britain (GB), Region, Local Authority
                          County/District
Date of last SQR or QMI*: September 2014
Contact details: BRES@ONS.gov.uk

Executive summary

The Business Register and Employment Survey (BRES) publishes employee and employment estimates at detailed geographical and industrial levels. It collects comprehensive employment information from businesses in England, Scotland and Wales, representing the majority of the Great Britain (GB) economy. Independently collected Northern Ireland data are then combined to produce estimates on a United Kingdom (UK) basis. High level estimates are published on the Office for National Statistics (ONS) website and more detailed estimates are published on the National On-line Manpower Information Service (NOMIS)® website. BRES is regarded as the definitive source of official government employee statistics by industry.

This document contains the following sections:

- Output quality
- About the output
- How the output is created
- Validation and quality assurance
- Concepts and definitions
- Other information, relating to quality trade-offs and user needs
- Sources for further information or advice

Output quality

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

ONS has 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

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* Quality and Methodology Information' (QMI) replaced 'Summary Quality Reports' (SQR) from 04/11

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

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

BRES publishes employee and employment estimates at detailed geographical and industrial levels. It collects comprehensive employment information from businesses in England, Scotland and Wales representing the majority of the GB economy. The Department of Finance and Personnel Northern Ireland (DFPNI) collects the same BRES information independently in Northern Ireland. Both data sources are then combined to produce estimates on a UK basis. BRES is regarded as the definitive source of official government employee and employment statistics by industry. Employment is obtained by adding the number of working owners to the number of employees employed by a business, where working owners include sole traders, sole proprietors and partners who receive drawings and/or a share of profits, but are not paid via PAYE.

In terms of data, the survey sample of approximately 80,000 businesses is weighted up to represent the GB economy covering all sectors. BRES data are not only used to produce employee and employment statistics but also to update the Inter Departmental Business Register (IDBR), which is the main sampling frame used for most ONS business surveys.

One of the strengths of BRES is that estimates are provided at detailed geographical and industrial levels (down to a lower super output geography at a 5-digit Standard Industrial Classification (SIC)). No other ONS employment survey output provides such information at these low levels and this enables a detailed analysis of employment at low level geographies and industries.

It should be noted BRES is a sample survey and produces estimated employment figures. These estimates are of a good quality at higher levels of geography (for example region). The quality of the estimates deteriorates as the geographies get smaller and this should be taken into account when considering the quality of sub-national estimates.

BRES is a point-in-time snapshot of the GB/UK economy and is not designed to be used as a time series, although it is recognised that users do use them in this manner. BRES is subject to discontinuities caused by Standard Industrial Classification change, reference date change and source data change, potentially making any time series analysis difficult.

Publication on the National Statistics website

BRES figures published on the ONS website are released within a statistical bulletin along with a number of detailed supplementary tables. The levels at which the estimates are published are indicated by a tick in table 1 below. Most published estimates have a quality measure attached and all figures on the ONS website are subject to standard ONS disclosure rules.

Table 1: The levels at which BRES estimates are published on the ONS website

Geography/Industry	5-digit SIC*	BIG**	Overall Totals
UK/GB inc private/public sector splits	√	√	√
Region inc private/public sector splits		√	√
Local Authorities (district/county/metropolitan) inc private/public sector splits			√

*SIC: Standard Industrial Classification

**BIG: Broad Industrial grouping

Publication on the National On-line Manpower Information Service (NOMIS ®)

BRES publishes GB based estimates on NOMIS ®. Estimates that can be obtained through NOMIS ® are potentially disclosive aggregate estimates down to a Lower Super Output Area (LSOA) geography at a 5-digit UK Standard Industrial Classification 2007 (SIC 2007). Access to these BRES estimates is only possible via the acquisition of a Chancellor of the Exchequer's Notice which

contains an associated Data Access Agreement (DAA). The acquisition of a Notice requires users to abide by the terms of the DAA. There is currently no financial cost for obtaining a Chancellor of the Exchequer's Notice.

In addition, BRES publishes a higher level open access dataset on NOMIS ®. This dataset provides public/private based employee/employment estimates at a country, region, LA county, LA district and Local Enterprise Partnership (LEP) geography. This open access public/private dataset does not require the acquisition of a Chancellor of the Exchequer's Notice.

Table 2: Key points of the BRES and BRES methodology

	BRES
What it publishes	On the ONS website: the number of employees/employment in the United Kingdom on a public/private and full-time/part-time basis. Results are available at GB 5-digit (UK 3-digit) SIC 2007 level and Local Authority District and County total. On NOMIS ®: the number of employees/employment in the GB economy on a full-time/part-time basis down to a 5-digit SIC and LSOA geography level. Employee/employment estimates by public/private split.
Frequency	Annual.
Sample size	Approximately 80,000.
Periods available	From 2009.
Sample frame	IDBR.
Sample design	Stratified random sample where the strata are defined by SIC 2007, country, and employment size of a business.
Weighting	Each responding business represents a number of similar businesses from the IDBR, based on number of employees and the SIC 2007. The sampling weights are adjusted for non-response and births and deaths within the BRES business universe and are combined with calibration weights, based on IDBR employee counts, to produce overall weights. Calibration is carried out at enterprise level. Weights are calculated annually.
Estimation	Estimation is based on local unit returns: direct domain estimation is used for high levels of aggregation whereas minimum domain estimation is used for lower levels.
Outliers	Winsorisation is the outlier treatment method used, which requires specifying parameter values using past data which is updated regularly.
Part-time definition	For the purpose of the survey, part-time is classed as 30 hours per week or less.

The BRES data and estimates are used widely, both within and outside government and are a vital source of business employee information. The key users and uses of the output include:

- **Eurostat** - BRES is a source of annual structural statistics for the Structural Business Statistics Regulation (SBSR), used for policy monitoring and formulation by the European Union (EU) via Eurostat
- **the Scottish Government (SG) and the Welsh Government (WG)** - BRES provides estimates on employee numbers which are essential in the analysis of Scottish Government and Welsh Government employment trends. Estimates on all sectors are incorporated into the Scottish and Welsh figures and may also be used in internal briefings
- **Department of Business, Innovation and Skills (BIS)** - the UK Department for Business, Innovation and Skills (BIS) uses BRES estimates to assess the structure and performance of industries
- **Workforce Jobs** - it is usual for the Workforce Jobs series (WFJ), much of which is initially based on the Short Term Employment Survey's estimate of employee jobs, to be benchmarked to the BRES estimate. This benchmarking usually takes place in time for the December Labour Market Statistics First Release in the following year

- **Annual Business Survey (ABS)** - the [ABS](#) collects financial data via the BRES questionnaire, which are then matched to employment estimates to calculate turnover per head
- **Local Government** - Local Government planning departments are major users of BRES using the estimates published on NOMIS ® to forecast trends in employment in their specific areas and to claim for Central Government and European funding
- **BRES** is one of the key data sources used to compile Nomenclature of Units for Territorial Statistics (NUTS) 2 and 3 Gross Value Added (GVA) data, with the NUTS2 data the key input to the allocation of EU structural funds to deprived regions of the EU
- **Additional** users include national government departments and bodies, businesses, academics and the general public. User groups are consulted to ensure that the data remain relevant to their needs

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 following list shows the time lag between publication and the reference period to which the data refer. These timings are for the publication of the BRES estimates for the 2014 survey period.

1.   Provisional National Results Release: 12 months after the reference period
2.   Revised National Results Release: 24 months after the reference period

The time lag between publication and the period to which the data refer is considered the minimum required to produce estimates of a high enough quality to meet user needs taking into consideration:

- the amount of time it takes contributors to complete and return the BRES forms (as BRES asks for detailed local unit information it can take contributors with a large number of local units a significant period of time to return all the completed forms)
- the large size of the BRES sample (some 80,000 contributors)
- the validation and quality checking of the data and estimates prior to publication

BRES revisions policy

The BRES revisions policy states the following:

Following the initial publication of the data for year t in September of year t+1, the data will be revised and re-released in September of year t+2 (that is at the same time as the release of the provisional data for year t+1). The revisions will arise from a complete rerun of survey results, including re-weighting and taking on any new returned data. The complete revised dataset will be re-released as the final dataset. Proposed revisions outside of this regime will be logged by the results team and considered for release if appropriate.

Revisions might also arise under other circumstances, for example, following a change in methodology or the introduction of a new SIC. If so, these revised datasets will be re-released in a planned and coordinated way. Significant revisions will be explained to both internal and external users at the time of release, subject to the usual rules on confidentiality.

For more details on related releases, the [UK National Statistics Publication Hub](#) 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](#).

How the output is created

Coverage

BRES estimates cover UK businesses registered for Value Added Tax (VAT) and/or Pay as You Earn (PAYE) and are classified using the SIC 2007. It covers all major industry groups, such as production, construction, distribution, service trades and many more groups in SIC 2007.

BRES obtains the required details on these businesses from the IDBR, which is used as the survey sampling frame.

The sample does not cover Northern Ireland. Northern Ireland contributor data are supplied directly to ONS by The Department of Finance and Personnel Northern Ireland (DFPNI).These data are added to the GB based tables produced by the BRES results system to produce UK based tables published on the ONS website. It should be noted that low level aggregate estimates published on NOMIS[®] cover GB only.

Likewise, the survey does not collect farm agriculture data. These data are supplied at an aggregated level by the Department for Environment, Food and Rural Affairs (DEFRA), the Scottish Government, the Welsh Government and the Department of Agriculture and Rural Development Northern Ireland (DARDNI). This means it is only possible to include farms agriculture in the BRES estimates at the lowest aggregated level of geography supplied, which is a Region level. These data are added to the estimates after BRES estimation has been run and are then included in the aggregate estimates.

Sample design

The BRES sample currently contains around 80,000 businesses from across the Great Britain economy. The IDBR is used as the sampling frame from which a stratified random sample is drawn. The strata are defined by SIC 2007, by country and by employment size, with all employment sizes of businesses being covered. The design is a stratified 1 stage clustered sample, where the stage 1 units (or clusters) are enterprises, or RUs, and the elements in each cluster are local units.

- An enterprise can be defined as the smallest combination of legal units that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise may carry 1 or more activities at 1 or more locations. An enterprise may be a sole legal unit.
- A reporting unit (RU) is the unit used for collection of information through statistical surveys. In most instances it equates to the enterprise but for the more complex businesses it is part of an enterprise defined by a list of local units (LU) ("local unit list reporter").
- The LU is an enterprise or part thereof (for example a workshop, factory, warehouse, office, mine or depot) situated in a geographically identified place. At or from this place economic activity is carried out for which, save for certain exceptions, 1 or more persons work (even if only part-time) for 1 and the same enterprise.

If an enterprise is selected for BRES, then all its constituent local units are selected. Data are requested from each local unit. Broadly, the sample is stratified into: large or complex enterprises, unusual enterprises, and medium and small enterprises. Medium and small enterprises are further stratified by country (England, Scotland and Wales) and two-digit SIC 2007. The strata containing large or complex or unusual businesses and medium enterprises in Scotland and Wales are take-all strata.

Adjusting design weights to unit non-response and births and deaths

Unit non-response is addressed via re-weighting and the standard ONS method for births and deaths adjustment is used: both adjustments are carried out at either sampling stratum level or post-stratum level (see below). The adjusted design weight is given by:

$$dweight = \frac{N}{n_r}\left(1 + \frac{n_d h_{bd}}{n_r - n_d}\right)$$

where N is the total number of enterprises in the universe in a given stratum, n_r is the number of responding enterprises, n_d is the number of dead enterprises among the respondents, and h_{bd} is the births-to-deaths ratio. The design weight is also referred to as the a-weight. In ONS, the birth-to-deaths ratio h_{bd} is set to 0 for businesses with a very large employment and 1 for other businesses. To implement this adjustment, ONS post-stratified the cells containing very large businesses (cells 1, 3 and 7) into 2 subcells each: a subcell for businesses with an employment equal to or exceeding a specified threshold and a subcell with employment below the threshold. The threshold has been set to 250. In the 3 subcells containing businesses whose employment equals or exceeds the threshold the births-to-deaths ratio has been set to 0; elsewhere this ratio has been set to 1.

Calibration

The adjusted design weights are calibrated with respect to total register employee counts. It is a 2-way calibration with respect to industry classification (by section) and region (by region), and it is carried out at RU level. Two calibration, or model, groups are defined: 1 group for cells containing large businesses, and another group for the remainder of the cells. It is assumed that the variance of RU returns is proportional to the register employee counts. Within each calibration group, the adjusted design weights are calibrated so that, in each section and each region, the estimate of total register employee count is equal to the total register employee count. Because calibration is at RU level, there is no need to adjust for births and deaths of local units. This is dealt with directly at the estimation stage. The estimation tool used to compute the calibration weights is the Generalized Estimation System (GES).

Outlier treatment

The estimation for the survey variables in BRES is based on local unit returned values; the treatment of outliers is also applied at local unit level. Winsorisation is the outlier treatment method used; this requires obtaining predicted values for the local units with returns.

Winsorisation parameter values (often referred to as L-values) have been derived for all 3 survey variables: total employees, full-time employee and part-time employees. Once all 3 variables have been winsorised, the components (full-time and part-time) are scaled to add up to the winsorised total employee value.

Estimation

Estimation is based on local unit level returned data, which means domains are defined on the basis of local unit SIC and region. So, the estimate of the total of a given variable Y in domain D is given by:

$$\hat{T}_{y,D} = \sum_{i \in s_r} \sum_{l \in D} a_i g_i \tilde{y}_{i,l}$$

where a_i and g_i are the adjusted design and g-weights for responding RU i, respectively, s_r is the set of responding RUs, and $\tilde{y}_{il}$ is the winsorised value of the return from local unit l in RU i.

Variance estimation

Standard errors and coefficients of variation for every specified domain are produced by the tool GES, apart from those below the minimum domain (see below).

Minimum domain methodology

Minimum domains are the lowest level at which direct estimates, that is those obtained by applying weights to the returned data, are considered robust. Although BRES collects data at the individual local unit level, it estimates employment for all non-sampled local units in the BRES business universe. The weighted employment less the returned employment is spread pro-rata across the non-surveyed units on the basis of their IDBR registered employment, while returned values are preserved, giving estimates with relatively low variance even at very detailed levels, but at the expense of introducing some bias. The current minimum domains are set at region geography and a combination of 2-digit and 3-digit SIC 2007 industry levels. The use of minimum domains provides good quality estimates at low level geographies, although this method means that accurate standard errors cannot be calculated for estimates below the minimum domain level.

The estimates produced by GES do not reflect the use of minimum domains and tend to be very large for low levels of aggregation. Approximate standard errors that take into account the minimum domain methodology but that ignore the bias introduced can be produced using the bootstrap method (re-sampling techniques for inferring the distribution of a statistic derived from a sample). The approach taken is to use GES for levels of aggregation at or above the minimum domains, overall and by public and private, and to use the bootstrap for levels below the minimum domains.

Statistical disclosure

BRES is conducted under the Statistics of Trade Act (STA) 1947. This Act imposes restrictions on the way that data collected during the survey may be used. The provisions of the STA are further regulated by the Employment and Training Act 1973 (ETA) as amended by the Employment Act 1989, which states that local planning authorities may use confidential data only for purposes that relate to development plans.

The main aim of these restrictions is to protect the identity of individual businesses, which have made statistical returns, from being disclosed or otherwise deduced. Some of the outputs have already been subjected to disclosure control and, therefore, the issue of confidentiality does not arise. However, employee information extracted by users of the NOMIS $^®$ database has not been suppressed and contains potentially disclosive cells.

Access to NOMIS $^®$ is restricted, by the provisions of the ETA 4(3) (f), to holders of Chancellor of the Exchequer's Notices. Users are required to agree a DAA and agree to be bound by the conditions contained within, in order to access the estimates.

Users of BRES estimates on NOMIS $^®$ are personally responsible for ensuring that any information which they publish or pass on to other users does not contain disclosive figures. More information is provided via the BRES guide to use of potentially confidential data.

Validation and quality assurance
Accuracy
(The degree of closeness between an estimate and the true value.)

Estimates are subject to various sources of error. Total error consists of 2 elements, the sampling error and the non-sampling error. More detail on estimates and measures of these errors can be found via the BRES homepage. Quality measures are also published alongside all standard outputs on the ONS website, which provides useful information for the users on the quality of the data.

Sampling error

BRES is based on a sample survey estimating the number of employees, which gives rise to sampling error. The actual sampling error for any estimate is unknown but we can estimate, from the sample, a typical error, known as the standard error. This provides a means of assessing the accuracy of the estimate when an unbiased or approximately unbiased estimator is used. The lower the standard error, the more confident we can be that the estimate is close to the true value. The coefficient of variation (CV) can be calculated as the standard error divided by the estimate, and it is used to compare the relative accuracy across surveys or variables. The CV is 1 indicator of the quality of the estimate; the smaller the CV the higher the precision.

Quality measures are published alongside outputs, which will provide useful information for the users on the quality of the data. The CVs and standard errors are available at all geographies published on the BRES product page. The CVs and standard errors are calculated from current Geography estimates.

Non-sampling error

Non-sampling error is not easy to quantify and includes errors of coverage, measurement, processing and non-response. Response rates give an indication of non-response bias in estimates when it can be assumed that the differences between responders and non-responders are the same regardless of response rates.

In seeking to maximise the accuracy of the survey estimates, the sample selection is carried out after the annual IDBR update processes are complete. This should minimise the selection of misclassified businesses and inadequate coverage of newly established businesses and defunct reporting units.

Various procedures are in place to ensure that errors are minimised. Year-on-year comparisons are made at respondent, local unit and aggregate level. Disparities are investigated to ensure the consistent annual returns. Congruence checks are made against other surveys to ensure consistent values across industries from different surveys.

As BRES is used both to update the register and to produce estimates, there is a risk of feedback bias. To reduce this bias to a minimal level, the register employee count is modelled using survey data, and the modelled values are used in the auxiliary variable in calibration.

Another indicator of accuracy is reliability, which can be measured by assessing the difference between the first published estimate and the final revised figure. BRES adheres to a Revisions Policy whereby current survey estimates together with a revision of the previous year's survey estimates are published. Late returns or information received in the course of the following year's survey may lead to changes to the estimates after the provisional publication. Such changes are incorporated into the figures when the revised estimates are published in the following year (see BRES Revisions Policy above).

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.)

BRES replaced the ABI/1 employee survey. It represents a change in methodology and data source when compared to the ABI/1, which had been published on a comparable basis since 1997. Any comparison to the ABI/1 estimates must be treated with caution. Work has been undertaken to identify and explain the reasons for, and impact of, any discontinuity and a paper relating to this can be found on both NOMIS ® and the BRES product page. Scaling factors can be calculated by using the estimated BRES and ABI/1 2008 estimates to produce a time series on a consistent basis. Further details of the discontinuity analysis can be found on the BRES homepage.

Individual returns are classified using SIC 2007 in line with Eurostat guidelines. With regards to the ABI/1, data for 1997 – 2002 were collected under SIC 1992 and data from 2003 onwards collected under SIC 2003. Both the 2007 and 2008 ABI/1 estimates were published on a SIC 2003 and SIC 2007 basis.

Users of BRES require that ONS employment statistics be coherent with each other; this is achieved by applying congruence checks between BRES and Monthly Business Survey (MBS) returns and using common methods where possible. As the BRES sample size is bigger than that of MBS, BRES outputs are more accurate and hence estimates from the Workforce Jobs Series are benchmarked to BRES estimates on an annual basis.

The Labour Force Survey (LFS) is regarded by ONS as the best measure of total jobs in the economy. The BRES outputs are regarded as the best estimates at a detailed regional and industrial level. The main differences between them are:

- BRES is a point-in-time survey requesting employee counts on a specific date in the year. The LFS estimates are averages for 3-month periods
- the LFS definition of employment is anyone (aged 16 or over) who does at least 1 hour's paid work in the week prior to their LFS interview, or has a job that they are temporarily away from (for example on holiday). On the other hand, BRES produces point-in-time estimates of full and part-time employees on the payroll
- unlike BRES, LFS includes people who do unpaid work in a family business, Government Supported Trainees and HM Forces. It should be noted that includes the self-employed as long as they are registered for VAT or PAYE. As the LFS includes these "below the threshold" very small businesses employee estimates from LFS and BRES are not directly comparable
- LFS is a household survey while BRES is a survey of businesses. There is often a conflict between which industry people actually work in and which they think they work in, and LFS relies on respondents to self-classify to an industry. The answers that employees give in response to the LFS industry question may be influenced by the nature of their own job, which may not reflect the main activity of the organisation for which they work. As a result BRES figures give a more reliable industry breakdown than LFS

BRES also improves the timeliness of the employment data on the IDBR through an increased sample size and improved design. This improves the accuracy of all estimates produced from register-based surveys through increased accuracy of the auxiliary variable (for example, employment).

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

The BRES definition of an employee is anyone working on the BRES reference date who is aged 16 years or over that the contributor directly pays from its payroll(s), in return for carrying out a full-time or part-time job or being on a training scheme. Part-time workers are classed as those who work 30 hours per week or less.

This includes:

- all workers paid directly from the business's payroll(s)
- those temporarily absent but still being paid, for example on maternity leave
- employees at sites where the planned activity is for less than 1 year
- employees at sites manned for less than 20 hours per week

This excludes:

- any agency workers paid directly from the agency payroll
- voluntary workers
- former employees only receiving a pension
- self-employed workers (not paid via the business's payroll(s)) where identified
- working owners who are not paid via PAYE

Employment is obtained by adding the number of working owners to the number of employees. Working owners include sole traders, sole proprietors and partners who receive drawings and/or a share of profits, but are not paid via PAYE.

BRES also collects data to fulfil the UK's obligations under the Structural Business Statistics (SBS) Regulation of the European Union, established by the Council Regulation (EC, Euratom) No 58/97 of 20 December 1996. This established a common framework for the production of Community statistics on the structure, activity, competitiveness and performance of businesses in the Community. Data are transferred to Eurostat and used for policy monitoring and formulation by the EU, and as a source for annual structural statistics.

The figures are collected and presented using SIC 2007 in line with Eurostat guidelines.

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

BRES provisional national results are published 12 months after the reference period. The time lag between publication and the period to which the data refer is the minimum required to produce estimates of a high enough quality to meet all user needs. These results are revised 24 months after the reference period and can be considered more reliable in that they include late responder data and/or the correction of data errors that were not identified in time for the provisional release.

Further information on release dates and the BRES revisions policy are contained in the Timeliness and punctuality section of this paper.

Assessment of user needs and perceptions
(The processes for finding out about uses and users, and their views on the statistical products.)

A number of forums exist to obtain user views and the uses to which BRES data is put. The BRES User Group (BUG) comprises delegates selected from government bodies who have been identified as key users of the BRES estimates.

Information on how BRES data is used as well as users' experience of the service provided is obtained in a number of ways, such as:

- information obtained from NOMIS ® regarding who requests access to BRES data, and their reasons for wanting this access
- internet based research looking at what uses are made of the BRES tables published on the ONS website

- regular consultation with users in Local Government via the Central Local Information Partnership
- frequent ad hoc meetings with Welsh and Scottish Governments
- during the development of the BRES a web consultation exercise was undertaken inviting users of annual employment estimates (which at the time was from the Annual Business Inquiry) to provide their views and comments. These comments were used in developing BRES to ensure user needs were met. A paper was published summarising the views of users in response to this open consultation. A copy of both the consultation document and response can be found on the NS website: Business Register and Employment Survey for Users
- placing a voluntary questionnaire on the BRES ONS web page asking those using the site information regarding their use of the BRES data
- feedback and questions posted on the RSS's StatsUserNet website

An analysis of BRES users who apply for a Chancellor's Notice to access BRES employee estimates on NOMIS $^®$ was used to ascertain the main users of BRES and can be found in table 3. This shows that around 41% of the users who held a Notice to access the 2013 BRES estimates were from central and local government, with commercial organisations close behind at 38%.

Table 3: Main users of BRES estimates on NOMIS $^®$

Description	Areas selected	percentage
Central/Local Government and NHS	9,200	41
Commercial	8,600	38
Not-for-profit Organisation	1,700	7
University	1,000	5
Training Body	700	3
Personal	400	2
School / College	100	0
Other	900	
		100

There are a number of plans to further ONS's knowledge of the uses of BRES and who uses it. These include:

- expanding the BRES user group by using responses to the voluntary web questionnaire to see if there are any key users of BRES that might be interested in attending the user group
- review annually the usage made of the BRES data from NOMIS $^®$
- consulting local government users regarding the specific uses made of the BRES statistics

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.)

ONS's 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. The ONS 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 the ONS website but not produced by the ONS, or referenced on the ONS website but stored elsewhere, may vary. 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)
- Copyright and reuse of published data
- Pre-release access (including conditions of access)
- Accessibility

In addition to this Quality and Methodology Information, Basic Quality Information relevant to each release is available in the background notes of the relevant Statistical Bulletin.

Apportionment of Financial Variables Using BRES Local Unit Turnover Data – Investigating the Robustness of the Methodology

Salah Merad, Office for National Statistics   *April 2012*

1. Introduction

Local unit turnover has been collected in the Business Register and Employment Survey (BRES) since 2009, and an apportionment methodology that utilises this variable has been developed. It was found that the new methodology should improve the regional estimates of two variables: turnover and purchases. The usefulness of the new methodology for the components of Gross Value Added (GVA), for example 'changes in stocks', would be limited. Because of insufficient resources, BRES turnover data had limited validation in 2009 but no validation in 2010. Although a lot of care was taken is determining valid, and hence usable, data, it is quite likely that some data errors remained in the data. A few cases were found when comparing 2010 data with 2009 data. In one instance, a large value was returned but, because it was transcripted outside the boxes provided on the questionnaire, the return was not scanned – it was captured as a blank. This local unit (LU) is in Wholesale and located in London. When corrected, the proportion of turnover in Wholesale in London was found to be only 1% lower than the corresponding proportion under the current methodology – the difference reported with the original data was 2.5%. Because other data errors may still be present in the data, there may be issues with the reliability of the results, in particular the details.

In this paper we present a comparative analysis of the application of the new methodology to 2009 and 2010 ABS data. In addition to the analysis of regional apportionment of turnover and GVA, we consider year-on-year change in estimates and the issue of volatility in estimates.

2. Results

We present a comparative analysis for the whole economy and for two sectors: Wholesale and Retail (Section G) and Manufacturing (Section C).

2.2 Whole economy

Table 1 shows the regional apportionment of the estimates of turnover in 2009 and 2010 under the current method and the new method. We can see that in both years the London percentage is lower under the new method by 0.7% and 0.4%, respectively. The differences in other regions are similar from year to year. Table 2 shows similar results for GVA: the pattern is similar for London and the East of England, lower by about 0.3% in both years, but other regions, including Scotland, show a different pattern in the two years.

Table 3 shows the year-on-year percentage change in the estimates of turnover, purchases and GVA. It can be seen that for turnover and purchases the magnitude of the changes are comparable in most regions, but the change is much higher under the current method in the North East and Wales. GVA does not follow the same pattern as turnover and purchases; for instance, the magnitude of the change is quite similar in Wales. This is to be expected given that GVA is a derived variable with 11 components.

Table 1. Regional apportionment of turnover

Region	Turnover in 2009			Turnover in 2010		
	Current method	BRES-based method	Difference	Current method	BRES-based method	Difference
NE	2.65	2.75	0.09	2.74	2.73	-0.01
NW	9.22	9.34	0.12	8.88	9.02	0.14
YH	6.09	6.16	0.07	6.05	6.11	0.06
EM	5.34	5.44	0.11	5.10	5.15	0.05
WM	6.97	6.94	-0.03	7.34	7.24	-0.09
EE	7.81	7.78	-0.04	7.97	7.98	0.01
LON	27.31	26.63	-0.68	27.68	27.27	-0.41
SE	15.27	15.31	0.03	14.90	14.99	0.09
SW	6.48	6.57	0.09	6.32	6.38	0.06
Wal	2.96	3.10	0.14	3.20	3.24	0.04
Sco	7.94	8.02	0.08	7.95	8.03	0.08
NI	1.97	1.97	0.00	1.86	1.86	0.00
Total	100.00	100.00	0.00	100.00	100.00	0.00

For definitions of regions see annex 1.

Table 2. Regional apportionment of GVA

Region	GVA in 2009			GVA in 2010		
	Current method	BRES-based method	Difference	Current method	BRES-based method	Difference
NE	2.72	2.87	0.15	2.85	2.88	0.03
NW	9.55	9.63	0.07	10.09	10.07	-0.02
YH	6.29	6.32	0.02	6.06	6.25	0.20
EM	5.54	5.65	0.11	5.34	5.28	-0.06
WM	6.44	6.59	0.15	7.08	7.07	-0.01
EE	8.22	7.93	-0.29	8.20	7.88	-0.32
LON	23.40	23.04	-0.35	23.08	22.82	-0.26
SE	15.34	15.58	0.24	15.10	15.40	0.30
SW	7.45	7.55	0.10	7.19	7.31	0.12
Wal	2.90	3.05	0.15	2.81	2.92	0.11
Sco	10.16	9.82	-0.34	10.24	10.16	-0.07
NI	1.97	1.97	0.00	1.96	1.96	0.00
Total	100.00	100.00	0.00	100.00	100.00	0.00

Table 3. Year-on-year percentage change in estimates – Whole economy

Region	Turnover		Purchases		GVA	
	Current method	BRES-based method	Current method	BRES-based method	Current method	BRES-based method
NE	9	5	10	6	8	3
NW	1	2	0	0	9	7
YH	5	4	9	7	-1	2
EM	1	-1	2	2	-1	-4
WM	11	10	12	12	13	10
EE	7	8	10	11	3	2
LON	7	8	8	10	1	2
SE	3	3	5	5	1	2
SW	3	2	4	3	-1	-1
Wal	14	10	22	16	-1	-2
Sco	5	5	7	5	4	6
NI	-1	-1	-2	-2	2	2
Total	5	5	7	7	3	3

2.2 Analysis in some sectors

Wholesale and Retail

From Table 4, it can be seen that London shows a fall of nearly 1% in both years under the new method in its percentage of the turnover estimate in this sector; the differences in other regions are quite small. For GVA (see Table 5), the picture is less clear: London shows a fall in both years under the new method, but the magnitude is much higher in 2010 (-1.3% against -0.5% in 2009); the South East moves in the opposite direction to London; the East of England shows quite a large fall in both years. The year-on-year change for turnover and purchases is similar to that under the whole economy, but the pattern is quite different for GVA. In many regions, even though there is little difference in the percentage changes in turnover and purchases, GVA shows a large difference between the two methods - the regions NW, YH, EM, WM and the SE are examples of this (see Table 6). In Scotland, the difference between the two methods is quite dramatic: the percentage change is -11% under the current method and 12% under the new method. This is because the year-on-year change under the new method is higher for turnover and lower for purchases. Still, it would be useful to carry out more data checks and external validation, against other sources if available, to see which method produces the more reliable estimates of GVA.

Table 4. Regional apportionment of turnover in Wholesale and Retail

Region	Turnover in 2009			Turnover in 2010		
	Current method	BRES-based method	Difference	Current method	BRES-based method	Difference
NE	1.82	1.99	0.17	1.80	1.87	0.07
NW	8.34	8.45	0.11	7.69	7.80	0.11
YH	4.90	4.94	0.04	5.05	5.15	0.10
EM	4.71	4.87	0.16	4.45	4.58	0.13
WM	6.57	6.49	-0.07	6.64	6.44	-0.20
EE	7.57	7.51	-0.06	7.73	7.76	0.03
LON	36.65	35.81	-0.84	37.52	36.68	-0.83
SE	14.99	14.98	-0.01	14.50	14.70	0.20
SW	5.86	6.01	0.15	5.95	6.05	0.10
Wal	2.06	2.26	0.20	2.28	2.35	0.08
Sco	4.76	4.92	0.16	4.68	4.91	0.23
NI	1.77	1.78	0.00	1.72	1.70	-0.01
Total	100.00	100.00	0.00	100.00	100.00	0.00

Table 5. Regional apportionment of GVA in Wholesale and Retail

Region	GVA in 2009			GVA in 2010		
	Current method	BRES-based method	Difference	Current method	BRES-based method	Difference
NE	2.86	3.30	0.44	2.81	3.01	0.20
NW	11.65	11.73	0.08	12.98	12.13	-0.85
YH	6.82	6.56	-0.26	6.44	7.10	0.66
EM	6.99	7.12	0.13	6.85	7.01	0.16
WM	5.95	6.88	0.92	7.38	7.57	0.19
EE	11.17	10.22	-0.94	10.33	9.12	-1.21
LON	17.97	17.43	-0.53	16.32	14.99	-1.33
SE	16.32	16.88	0.55	17.01	18.41	1.40
SW	7.15	7.59	0.43	7.50	7.81	0.31
Wal	2.88	3.29	0.41	2.61	3.12	0.51
Sco	7.66	6.45	-1.21	6.74	6.86	0.12
NI	2.57	2.55	-0.03	3.03	2.87	-0.16
Total	100.00	100.00	0.00	100.00	100.00	0.00

Table 6. Year-on-year percentage change in estimates in Wholesale and Retail

Region	Turnover Current method	Turnover BRES-based method	Purchases Current method	Purchases BRES-based method	GVA Current method	GVA BRES-based method
NE	5	1	7	2	-1	-4
NW	-2	-1	0	2	13	9
YH	10	12	15	13	-5	14
EM	1	1	1	1	-1	4
WM	8	7	8	8	25	16
EE	9	11	13	15	-7	-6
LON	9	10	10	11	-8	-9
SE	3	5	4	5	5	15
SW	8	8	9	8	6	9
Wal	18	12	24	15	-8	0
Sco	5	7	9	6	-11	12
NI	3	3	0	0	19	19
Total	6	7	8	9	1	6

Manufacturing

Table 7, Table 8 and Table 9 show the results in Manufacturing. The differences between the regional proportions are generally small in both years for turnover; however, for GVA there are some rather notable differences in 2010; for example, in the region NW, where the percentage under the new method is about 1% higher, and the region EM , where the percentage under the new method is about 1% lower.

Table 7. Regional apportionment of turnover in Manufacturing

Region	Turnover in 2009 Current method	Turnover in 2009 BRES based method	Turnover in 2009 Difference	Turnover in 2010 Current method	Turnover in 2010 BRES-based method	Turnover in 2010 Difference
NE	4.76	4.71	-0.05	5.30	5.21	-0.10
NW	13.42	13.49	0.07	14.56	15.00	0.44
YH	10.39	10.42	0.04	10.25	10.41	0.15
EM	9.06	9.24	0.18	8.81	8.59	-0.22
WM	9.28	9.32	0.04	9.97	10.06	0.09
EE	8.32	8.30	-0.03	8.71	8.74	0.03
LON	5.47	5.17	-0.30	4.63	4.54	-0.09
SE	12.88	12.83	-0.05	11.66	11.90	0.25
SW	7.29	7.29	0.00	7.50	7.20	-0.30
Wal	7.38	7.55	0.18	7.71	7.69	-0.01
Sco	8.04	7.96	-0.08	7.38	7.13	-0.25
NI	3.73	3.72	-0.01	3.52	3.54	0.02
Total	100.00	100.00		100.00	100.00	

Table 8. Regional apportionment of GVA in Manufacturing

Region	GVA in 2009			GVA in 2010		
	Current method	BRES based method	Difference	Current method	BRES-based method	Difference
NE	3.76	3.78	0.02	4.54	4.57	0.02
NW	13.40	13.54	0.14	16.11	17.17	1.06
YH	10.40	10.51	0.12	9.01	9.42	0.41
EM	9.41	9.80	0.39	8.93	7.87	-1.06
WM	8.68	8.85	0.17	9.65	10.03	0.38
EE	9.20	8.89	-0.30	9.70	9.65	-0.05
LON	5.39	5.31	-0.08	5.37	5.38	0.01
SE	12.26	12.36	0.11	9.51	10.13	0.62
SW	8.25	8.17	-0.08	9.04	8.21	-0.83
Wal	5.36	5.41	0.05	5.94	5.88	-0.06
Sco	10.23	9.71	-0.52	8.89	8.31	-0.58
NI	3.67	3.65	-0.01	3.30	3.39	0.08
Total	100.00	100.00		100.00	100.00	

Table 9. Year-on-year percentage change in estimates in Manufacturing

Region	Turnover		Purchases		GVA	
	Current method	BRES based method	Current method	BRES based method	Current method	BRES based method
NE	20	18	21	19	33	29
NW	16	18	9	11	32	35
YH	6	6	13	13	-5	-4
EM	4	-1	5	6	4	-14
WM	15	15	16	16	22	21
EE	12	12	13	13	16	16
LON	-9	-6	-12	-8	9	8
SE	-3	-1	4	6	-15	-13
SW	10	5	3	2	20	7
Wal	12	8	12	9	22	16
Sco	-2	-5	1	-2	-5	-9
NI	1	1	5	5	-1	-1
Total	7	6	8	8	10	7

2.3   Volatility analysis

An important quality criterion for estimates is their year-on-year volatility. The analysis needs to be based on a large of number of estimates to obtain reliable results. Therefore, we consider the magnitude of the year-on-year percentage change in the regional estimates of turnover and GVA under the current and new methods at Division level. Figure 1 and Figure 2 show a scatter plot of turnover and GVA estimates, respectively, under the two methods. It is not easy to see from the plots which method shows a lower magnitude of year-on-year change; a statistical analysis shows that the magnitude of change under the new method is not significantly different than under the current method.

Figure 1.

Comparing the magnitudes of year—on—year percentage change in turnover estimates
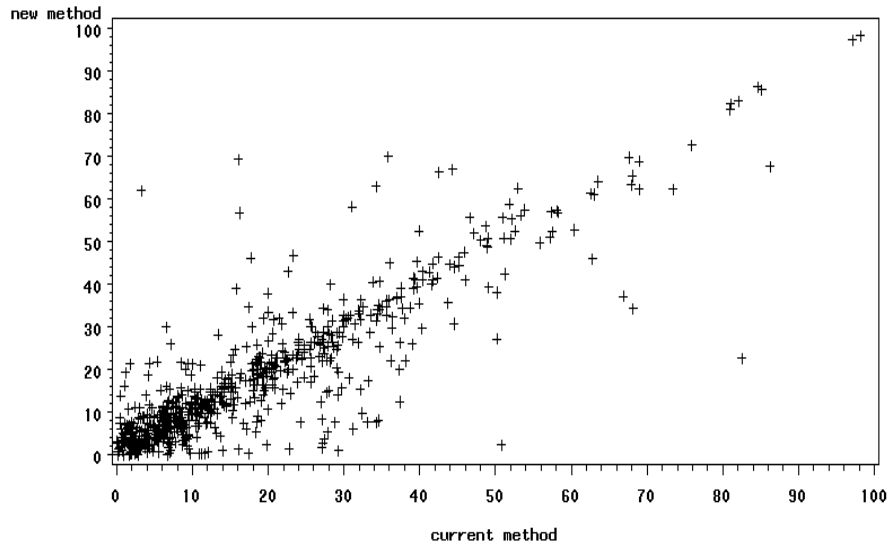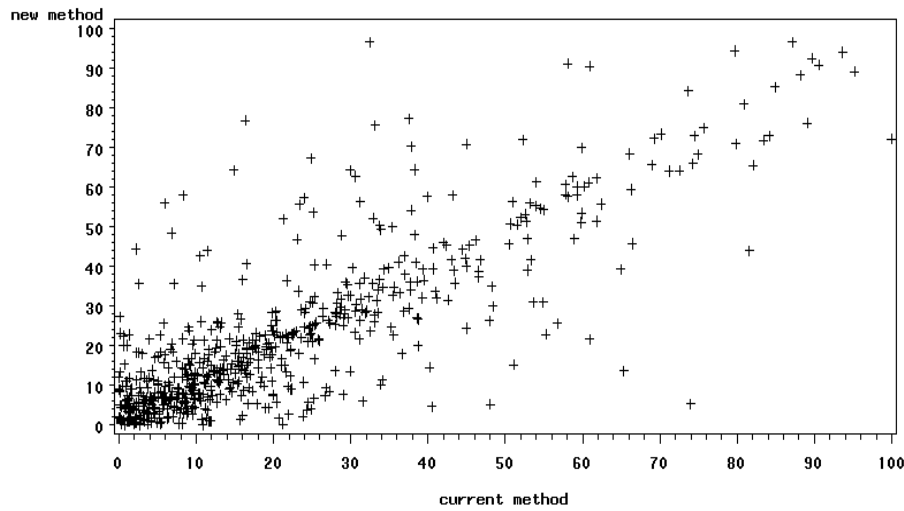Division by Region

Figure 2.

Comparing the magnitudes of year—on—year percentage change in GVA estimates
Division by Region

3. Conclusion

As was noted in the previous report on the new methodology, the validation of the collected turnover data is important: it was only carried out partially in 2009 and it was completely absent in 2010. A lot of effort was spent in determining what data to use in the development of the models for the new methodology, but errors may have remained undetected. Therefore, caution is needed in the interpretation of the results of the analyses presented in this paper. The results should be broadly reliable but the exact differences between the methods, in particular at lower levels of aggregation, would probably be sensitive to changes in the data. The analyses show that the performance of the new apportionment method is broadly consistent in the two years it was applied, 2009 and 2010, and hence the new method should be robust. For instance, the London percentage of total turnover is lower than under the current method by about 1% in both years. The picture is more complex for GVA, even at sector level. A striking example is that of Wholesale and Retail in Scotland. The current method shows an 11% year-on-year percentage fall in the estimate, whereas the new method shows a 12% percentage increase. Several other regions show large differences between the two methods. It would be very useful to carry out more checks on the data and consistency checks with other data sources to see which method produces the more reliable estimates. With regard to volatility, there is no significant difference between the current method and new method according to the measure used in this paper. A more useful measure would be the standard error of the regional estimates; unfortunately, the methodology and system for producing standard errors are not readily available. This could be done in the future if a resource was made available.

Annex 1.

Code	Region	Description
NE	North East	Tees Valley & Durham
		Northumberland & Tyne & Wear
NW	North West	Cumbria
		Cheshire
		Greater Manchester
		Lancashire
		Merseyside
YH	Yorkshire & The Humber	East Riding & North Lincolnshire
		North Yorkshire
		South Yorkshire
		West Yorkshire
EM	East Midlands	Derbyshire & Nottinghamshire
		Leicestershire, Rutland & Northamptonshire
		Lincolnshire
WM	West Midlands	Herefordshire, Worcestershire & Warwickshire
		Shropshire & Staffordshire
		West Midlands
EE	East of England	East Anglia
		Bedfordshire & Hertfordshire
		Essex
LON	London	Inner London
		Outer London
SE	South East	Berkshire, Buckinghamshire & Oxfordshire
		Surrey, East & West Sussex
		Hampshire & Isle of Wight
		Kent
SW	South West	Gloucestershire, Wiltshire & North Somerset
		Dorset & Somerset
		Cornwall & Isles of Scilly
		Devon
Wal	Wales	West Wales & The Valleys
		East Wales
Sco	Scotland	North Eastern Scotland
		Eastern Scotland
		South Western Scotland
		Highlands & Islands
NI	Northern Ireland	Northern Ireland