Working Futures 2017-2027: Long-run labour market and skills projections for the UK

Workbook user guide

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Contents

1. Introduction

Working Futures 2017-2027 is the latest in a series of quantitative assessments of the employment prospects in the UK labour market over a 10-year horizon. It presents historical trends and future prospects by sector for the UK and its constituent nations and the English regions. The prime focus of *Working Futures* is on the demand for skills as measured by employment by occupation and qualification, although the supply side is also considered. Its prime objective is to provide useful labour market information that can help to inform policy development and strategy around skills, careers and employment, for both policy makers and a much wider audience. The results are intended to provide a sound statistical foundation for reflection and debate among all those with an interest in the demand for and supply of skills.

2. Who is this guide for?

This guide is designed to assist new users of the Workbooks which have been generated as part of the *Working Futures 2017-2027* project.

Each Workbook contains historic and future employment projections by gender, status (full-time, part-time and self-employed), occupation, industrial sector and geographical area. There are also separate worksheets covering qualifications data. The different Workbooks are distinguished by their spatial focus. The projections are available for the period 2007 to 2027 inclusive. Consistent occupational (Standard Occupational Classification 2010, SOC2010) and industrial (Standard Industrial Classification 2007, SIC2007) classifications are used throughout the period covered by the Workbooks. The projections take account of the latest data published by the Office for National Statistics (ONS) from the Labour Force Survey (LFS), as well as the Business Register Employment Survey (BRES) and the Annual Business Inquiry (ABI).

It is envisaged that these general users will need to access the data in the Workbooks for a variety of purposes. These include:

- illustrating recent past, current and future trends in employment within their locus of responsibility (area or sector);

- comparative sectoral/spatial assessments;

- providing labour market information;

- deriving new employment projections based on their own additional information; and

- investigating future education and training needs, etc.

Requirements and Pre-requisites

The workbooks should be accessed using Microsoft Excel 2007 or later versions (use *> Help > About Microsoft Excel* to check which version you are using). Earlier vintages of Excel may result in 'out of memory' error messages. Users need at least an elementary knowledge of and experience in using Microsoft Excel.

Users of the most detailed Workbooks (i.e. for Local Enterprise Partnerships (LEPs) in England must be authorised to use The Business Register and Employment Survey in order to access the data. This requires you having a Nomis user identifier and having applied and been granted access to the BRES/ABI data. Once authorised, e-mail workingfutures@warwick.ac.uk with a copy of the authorisation e-mail which you received and you will be send details of how to access the workbooks.

All other enquiries: David Owen, IER, University of Warwick, email: D.W.Owen@warwick.ac.uk tel: 024 7652 4259

Each Workbook contains a worksheet illustrated in Figure 1 reminding users of their obligations under the *Statistics of Trade Act 1947* including the requirement not to pass disclosive data to a third party, or to publish the data in such a way that individual respondents can be identified.[1]

Figure 1: Warning notice

<div align="center">

WARNING
THIS EXCEL WORKBOOK CONTAINS DATA
BASED ON THE ANNUAL BUSINESS INQUIRY /
BUSINESS REGISTER AND EMPLOYMENT SURVEY

THESE DATA HAVE BEEN COLLECTED
UNDER THE TERMS OF THE Statistics of Trade Act 1947
THE ESTIMATES ARE BASED ON DATA ONS HAVE PLACED IN THE PUBLIC DOMAIN

THE CONTENTS OF THE WORKBOOK MAY ONLY BE VIEWED BY THOSE
AUTHORISED BY ONS TO USE "SAFEGUARDED" BRES DATA

It is a **criminal offence** to pass data on to a third party, including other individuals within your own organisation, or to publish the data in such a manner as to allow the identification of individual responses to the survey.

If in doubt about whether you are covered and what to do with regard to sharing information with partners please contact:

All enquiries: David Owen, IER, University of Warwick, email: D.W.Owen@warwick.ac.uk, tel: 024 7652 4259

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> **REPORTING**
>
> The projections presented in this Workbook are calculated from a number of different data sources, using a variety of econometric and statistical techniques. As a result, precise margins of error cannot be assigned to the estimates. For further details, see the *Working Futures* Technical Report.
>
> However, as a general rule of thumb, it is advisable to only publish statistics or analyses which are based on counts of at least 10,000 individuals. This should provide a reasonable degree of statistical robustness to the estimates whether historic or forecast, and also ensure that you are not in breach of the Statistics of trade Act, 1947.
>
> For cases in between 1,000 and 10,000 individuals, it is difficult to prescribe general rules, and an element of judgement on behalf of the user is needed. At an industry level, and focussing just on employees, the limits set by ONS in publishing ABI or BRES data can be used as a general guide. If ONS do not regard estimates as publishable then the equivalent figures in the workbooks should not be published. Where the focus is on self-employment or upon occupations, a more stringent cut-off should be applied.
>
> For unpublished analyses, a more lenient criterion can be used. However, the uncertainties associated with projections involving fewer than 1,000 individuals are probably too great for such estimates to be useful. However, there is inevitably some degree of judgement required on the part of the researcher.
>
> Thus, in summary, IER advise:
>
> PUBLISHED DATA: Ideally, a minimum of 10,000 individuals per cell
> UNPUBLISHED DATA: A minimum of 1,000 individuals per cell

This *User Guide* provides some guidance on accessing the available information and assessing what is appropriate in terms of publishing data from the Workbooks. When the

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[1] The workbook has been designed to open up on this warning page automatically. This feature can be disabled by simply renaming the 'Warning' worksheet.

Workbooks are first accessed, you may be prompted to 'Enable macros'.[2] If you want to use the manager sheet to change the years displayed in the tables, then macros must be enabled.

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[2] To enable Excel macros if they have been disabled (or if you do not know their current status), go to the Trust Center > Trust Center Settings > Macro Settings … and select 'Disable all macros with notification' (*Medium* in Excel 2003), if this is not already the chosen option. The Trust Center can be found in Excel Options (Excel 2010 to 2016) or by clicking the Microsoft Office Button (Excel 2007). If you have to change the security setting, then you will need to restart Excel for the change to come into effect. Note that some IT managers will have set the security level on 'Disable all macros without notification' (*High)* and as a consequence, the macros will not be available until the user changes the current setting.

3. What is this guide for?

This guide is designed:

- to introduce new users to the Workbooks;

- to inform users about the Workbooks that are available and the information they contain;

- to help users to access the data contained in the Workbooks;

- to advise users about the appropriate use of the Workbook data, especially regarding publishing; and

- to guide users toward additional sources of information and help regarding the use of the Workbooks.

This guide is not intended to provide detailed accounts of the sectoral or spatial projections in the Workbooks. These are presented in *Working Futures 2017-2027: Main report.*[3] Similarly, details of the modelling procedures used to derive the historic and future employment projections can be found in *Working Futures 2017-2027: Technical report.*[4]

In order to generate the different Workbooks, the *Working Futures* project has required forecasting almost a million individual time series (at the most detailed level, these comprise: sector (75) × occupation (25) x qualification (9 RQF levels) × area (9 English regions plus Scotland, Wales and Northern Ireland) × gender (2) × status (3)). In addition results have been produced for LEP local areas in England and economic sub-divisions of the other three nations. The workbooks are now organised according to the Spatial dimension. Each spatial workbook contains different levels of aggregation of the time series by sector/industry. This is a very detailed database - by far the most detailed available for the UK.

However, it is important to recognise that the data are not without limitations. These give rise to a number of considerations as to how the data should be used and reported. The limitations arise from two elements of the procedures which have been used to produce the projections: First, the projections are based upon survey data that were not originally designed or developed to produce precise estimates at this level of disaggregation. Second, the survey data have been used to calibrate an econometric forecasting model and a set of disaggregation procedures. Forecasting is as much an art as a science and requires considerable judgement on the part of the forecaster, especially when the forecast horizon is 10 years or greater. Any errors in the forecasters' ability to predict the

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[3] Wilson, R. A., S-A. Barnes, M. May-Gillings, H. Bui and S. Patel, (2019a). *Working Futures 2017-2027: Main report.* Department for Education.

[4] Wilson, R. A., M. May-Gillings, S. Patel and H Bui, (2019). *Working Futures 2017-2027: Technical report on sources and methods.* Department for Education.

future will be amplified the further into the future that the projections are considered, due to the inter-linkages between the sectors and regions, and the feedback mechanisms which permeate the model structure. The extent that the historical database is inaccurate due to the first data limitation further exacerbates this problem.

Thus, while the projections of employment are based on best practice, both the historic patterns of employment and the forecast projections have inbuilt uncertainties of differing kinds. These uncertainties need to be considered when utilising the Workbooks. They apply with particular force to the more detailed estimates produced for local areas.

In addition to the limitations of the data which require consideration when reporting and using the information, the projections for the relative short term need to be regarded critically. They were produced during a period of considerable economic uncertainty following the results of the 2016 Referendum on Brexit and its implications for the UK departing from the European Union (EU).

In such circumstances producing robust economic and labour market projections is particularly difficult. The *Working Futures 2017-2027* projections were developed in the second half of 2018. The forecast assumes that the UK makes an orderly departure from the EU (Brexit).

Changing patterns of employment by sector and occupation are largely dominated by longer-term trends rather than the cyclical position of the economy. The results from the current set of projections can therefore be used as a robust guide to likely future developments in the structure of employment, whatever the outcome of the Brexit process.

4. What Workbooks are available?

The Workbooks are made available via the internet subject to some restrictions on access to the most detailed data. The most detailed data files will not be available on a public site.

A new Database has been developed for *Working Futures 2017-2027*. Separate Workbooks have been produced for each of the main spatial areas (UK, GB, England and the devolved nations, the English Regions and 39 LEP areas in England). The UK and other spatial areas distinguish 75 industries (SIC2007 2 digit categories except where these are too small to provide reliable data (in which case they have been aggregated together)).

In each case there are two workbooks:

1. The first is a "***Database***" file or Workbook. This contains:

    - a 'Demand' tab (gender, status, industry, occupation qualification and the years 2007-2027;

    - a 'Replacement Demand' (RD) tab (gender, industry, occupation, qualification and the years 2007-2027); and

    - a 'values lookup' tab (this provides the names associated with the values for each variable).

2. Secondly a "**Main tables**" file or Workbook, which contains summary employment and RD tables for different aggregations of industry and occupation.

The LEP workbooks adopt a more aggregate picture for industry going down to 22 sectors.

Naming convention for the Workbooks

The main set of Workbooks is labelled using a consistent nomenclature of the form *YY*.xlsm where:

- *YY* denotes the spatial aggregation, using an area acronym.

YY: **Spatial aggregation**

Geographically, the Workbooks are available at a number of levels:

- **UK**.xlsm- the whole of the UK;

- **GB**.xlsm- for Great Britain;

- for the 4 countries of the UK (**EN**gland, **WA**les, **SC**otland and **N**orthern **I**reland);

- for the 9 English regions (**LO**ndon, **S**outh **E**ast, **S**outh **W**est, **E**ast of **E**ngland, **W**est **M**idlands, **E**ast **M**idlands, **Y**orkshire and the **H**umber, **N**orth **W**est and **N**orth **E**ast); and

- for LEP and other local areas:
  - **BC**.xlsm covers Black Country
  - **BU**.xlsm covers Buckinghamshire Thames Valley
  - **CH**.xlsm covers Cheshire and Warrington
  - **CC**.xlsm covers Coast to Capital
  - **CI**.xlsm covers Cornwall and Isles of Scilly
  - **CW**.xlsm covers Coventry and Warwickshire
  - **CU**.xlsm covers Cumbria
  - **DN**.xlsm covers Derby, Derbyshire, Nottingham and Nottinghamshire
  - **DO**.xlsm covers Dorset
  - **M3**.xlsm covers Enterprise M3
  - **GC**.xlsm covers Gloucestershire
  - **BS**.xlsm covers Greater Birmingham and Solihull
  - **CP**.xlsm covers Greater Cambridge and Greater Peterborough
  - **LI**.xlsm covers Greater Lincolnshire
  - **GM**.xlsm covers Greater Manchester
  - **HS**.xlsm covers Heart of the South West
  - **HE**.xlsm covers Hertfordshire
  - **HU**.xlsm covers Humber
  - **LA**.xlsm covers Lancashire
  - **LD**.xlsm covers Leeds City Region
  - **LL**.xlsm covers Leicester and Leicestershire
  - **LV**.xlsm covers Liverpool City Region
  - **LN**.xlsm covers London Enterprise Panel
  - **NA**.xlsm covers New Anglia
  - **NO**.xlsm covers North Eastern
  - **OX**.xlsm covers Oxfordshire
  - **SH**.xlsm covers Sheffield City Region
  - **SL**.xlsm covers Solent
  - **SO**.xlsm covers South East
  - **SM**.xlsm covers South East Midlands
  - **ST**.xlsm covers Stoke-on-Trent and Staffordshire
  - **SN**.xlsm covers Swindon and Wiltshire
  - **TV**.xlsm covers Tees Valley
  - **TB**.xlsm covers Thames Valley Berkshire
  - **MA**.xlsm covers The Marches
  - **WE**.xlsm covers West of England
  - **WO**.xlsm covers Worcestershire
  - **YY**.xlsm covers York North Yorkshire and East Riding

The 38 LEP workbooks are detailed above. The main set of 15 Workbooks is detailed in Table 1. In addition there are a few supplementary Workbooks which are only available for limited geographies. The *OverviewTablesCharts* workbook contains a comparison of the 9 English regions plus England, Wales, Scotland and Northern Ireland.

There are 6 levels of sectoral/industry aggregation used in the Workbooks, ranging from all sectors aggregated together down to the 75 Detailed Industry classification. The Workbooks cover:

- All Sectors;

- 6 Broad Sectors;

- 22 Industries (as used for general reporting);

- 75 Detailed Industries.

Table 1: Workbooks by geographical area and sectoral coverage

	Geographical area	All industries	6 Broad sectors	22 Industry groups	75 Detailed industries
Countries	United Kingdom	Y	Y	Y	Y
	Great Britain	Y	Y	Y	Y
	England	Y	Y	Y	Y
	Wales	Y	Y	Y	Y
	Scotland	Y	Y	Y	Y
	Northern Ireland	Y	Y	Y	Y
English regions	London	Y	Y	Y	Y
	South East	Y	Y	Y	Y
	East of England	Y	Y	Y	Y
	South West	Y	Y	Y	Y
	West Midlands	Y	Y	Y	Y
	East Midlands	Y	Y	Y	Y
	Yorkshire and the Humber	Y	Y	Y	Y
	North West	Y	Y	Y	Y
	North East	Y	Y	Y	Y
Local Enterprise Partnerships (examples)#	Leeds City Region	Y	Y	Y	
	Liverpool City Region	Y	Y	Y	
	Stoke on Trent & Staffordshire	Y	Y	Y	

See previous page for full list.

5. What information do the Workbooks contain?

In the previous set of *Working Futures 2014-2024* workbooks there were 12 worksheets named 'All' through to 'FemalesSE' in each Workbook containing the basic data for the various gender and status combinations. This information is now contained in the **Database** Workbook. The Tables and Figures are now all contained in the **Main Tables** Workbooks. These all have a common structure and contain the tables and figures used in the main report. The contents of these workbooks are summarised in Tables 2 and 3.

Table 2: *MainTables* **Workbook contents**

Warning	Warning on who is entitled to access the data as shown in Section 1 above. By default, each Workbook opens with this worksheet.
Info	Details of the MDM macro scenario underlying the projection, etc.
Manager	Details of the years that the tables and figures focus upon which can be changed by the users
Contents	List of sheets including the Main Tables and Figures
Various worksheets	A contents page is included for each Workbook which lists the Main Tables and Figures of the various worksheets
IndustryAggregation	Details of the industry aggregation used in this workbook

Table 3: Contents of Workbooks, Tables and Figures

Sheet name	Contents
Ind T1	Employment by Industry Sector (6 industries)
Ind T2	Employment by Industry Group (22 industries)
Ind T3	Employment by Industry (75 industries)
Ind T4	Employment by Industry Group in Sector (6 + 22 industries)
Ind T5	Employment Status by Industry Group and Gender (22 industries)
Ind T6	Employment Status by Industry and Gender (75 industries)
Ind F1	Bar Chart Growth in Employment by Industry Group (6 + 22 industries)
Ind F2	Line Chart Employment by Industry (6 + 22 industries)
IndOcc T1	Occupation Composition by Gender (9 occupations by 75 industries)
IndOcc T2	Occupation Composition by Employment Status (9 occupations by 75 industries)
Occ T1	Employment Change by Occupation Group and Gender and Replacement Demand (9 occupations)
Occ T2	Employment Change by Occupation and Replacement Demand (25 occupations)
Occ T3	Employment Change by Occupation in Occupation Group (9 + 25 occupations)
Occ T4	Occupation Composition by Gender (25 occupations)
Occ T5	Employment Change by Occupation Group, Status and Gender (9 occupations)
Occ F1	Bar Chart Growth in Employment by Occupation (9 + 25 occupations)
Occ F2	Line Chart Employment by Occupation (9 + 25 occupations)
Occ F3	Changes in Occupational Employment Structure (9 occupations)
Occ F4	Occupational Change by Gender (9 occupations)
Occ F5	Occupational Change by Status (9 occupations)
Qual T1	Employment by Qualification (9 qualifications)
Qual F1	Line chart Employment by Qualification (9 qualifications)
ShiftShare T1	Shift-Share by Occupation (25 occupations)
RD T1	Replacement Demand by Occupation and Qualification (25 occupations by 9 qualifications)
RD F1	Replacement Demand by Occupation Group (9 + 25 occupations)
Basic T1	Employment by Industry Sector, Occupation Group and Qualification (9 occupations by 6 industries by 9 qualifications)
Basic T2	Employment Change by Occupation and Replacement Demand (25 occupations by 9 qualifications)
Basic T3	Occupation by Qualification (25 occupations by 9 qualifications)

In all Workbooks, the data are provided on consistent occupational and industrial classification bases for all years using the Standard Occupational Classification 2010 (SOC2010) and the Standard Industrial Classification 2007 (SIC2007) respectively. The underlying basic dataset is constrained by the BRES/ABI sectoral information so it is

'workplace-based'.[5] In contrast, the occupational information relates to responses from households (from the LFS or Census of Population) and is therefore 'residence-based'. However, the LFS/Census information is converted to occupational shares within the industry of employment. These shares are then applied to the BRES/ABI-based sectoral data. The final occupational employment estimates are therefore effectively also workplace based. There is little or no information on how occupational structures within industries vary between residence and workplace but the differences are probably generally small.

The estimates take account of the latest BRES/ABI as well as the most recent data published by ONS based on the LFS. The LFS information has been used to constrain the estimates of occupational structure, both at a sectoral and spatial level. The LFS data are only used to determine occupational *shares* rather than employment *levels* (which are based on BRES/ABI).

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[5] Note that no account is taken of BRES/ABI inconsistencies from one year to the next (e.g. categorising Boots as 'pharmaceuticals' in one year and then retailing in another, or the recoding of the same employer to different geographical areas. Users should therefore be aware of 'surprising' results at a detailed local or sectoral level and refer back to the base data order to see if the explanation lies therein.

6. How can I access and use the information in the Workbooks?

Tables and charts

A set of standard tables and figures has been prepared in the UK-level Workbooks. These have then been replicated for all of the other Workbooks. Many of these tables and figures appear in the various *Working Futures* reports. Full details of what appears, where, are provided in *Working Futures 2017-2027: General Guidelines.*[6] Note that while the historical data are available from 2007, the tables and charts tend to illustrate patterns and trends over the three decades from 2007-2027.

The standard tables and figures can easily be adapted as required since they are all derived using simple Excel commands. New tables and figures can also be generated as required. In order to make changes and subsequently save them, users will need to download and save the files onto their own drives. It is recommended that any new tables and figures are placed in new worksheets – or in new workbooks linked to the *Working Futures* Workbooks.[7] If these new tables and figures have a more general application, then they may be added into the UK template when the Workbooks are updated.

Please note that:

- In adding new material to the Workbooks, or modifying the data that is presented, you are strongly advised to create a copy and to then modify this rather than change the original Workbooks;

- When 'cutting and pasting' to new worksheets, you should use '*Paste Special Values*' since some cells in the Workbooks use formulae which may not otherwise transfer correctly.

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[6] Wilson, R. A, (2019). *Working Futures 2017-2027: General Guidelines for using the workbooks.* Department for Education.

7. What can I publish?

This section provides some guidelines to assist in interpreting and utilising the *Working Futures* historic and forecast data, especially with regard to publication. There are two aspects to this issue – statistical precision or robustness and confidentiality.

Statistical precision/robustness

In *Working Futures 2017-2027: General Guidelines* (section 8)[8] and, in further detail, in *Working Futures 2017-2027: Technical Report* (section 13)[9], some guidelines for publication and for unpublished data analysis are suggested. These indicate the degree of precision with which the employment projections can be regarded.

First, it should be emphasised that any recommended guidelines for use of the Workbook data can only ever be 'rules of thumb', rather than based on robust statistical analysis given the modelling complexity and range of data sources used. The employment estimates make use of a wide variety of sources. As a consequence, it is not possible to calculate precise margins of error even for the historical estimates. From an analysis of previous projections it is clear that the differences between projected employment levels and observed outcomes can be quite large.

Industry employment levels are typically projected within ±10 per cent over a 5-10 year horizon. The directions of change are projected correctly in around 90 per cent of cases. The errors in terms of annual percentage growth rates are usually of the same order of magnitude as the observed changes.

Occupational employment levels are typically projected with ±7 per cent over a 5-10 year horizon. The direction of change is correctly projected in about 80 per cent of all cases. Occupational shares are usually projected within ±2 percentage points. (The typical share is around 4 percentage points).

Historical revisions to the data account for a very large part of the forecast errors. It is also important to recognise that making predictions in the social sciences is not the same as in science or engineering. A key objective of such projections is often to influence and change behaviour and therefore outcomes. Forecasting accuracy is in this sense a chimera. It is important to appreciate that the purpose of the projections is not to make precise forecasts of employment **levels**. Rather, the aim is to provide policy analysts and other interested parties with useful information about the general nature of **changing employment patterns** and their possible implications for skill requirements.

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[8] Wilson, R. A, (2019). *Working Futures 2017-2027: General Guidelines for using the workbooks.* Department for Education.

[9] Wilson, R. A., M. May-Gillings, S. Patel and H Bui, (2019). *Working Futures 2017-2027: Technical report on sources and methods.* Department for Education.

Thus, the results provide a useful benchmark for debate and policy deliberations about underlying employment trends. However, they should not be regarded as more precise than the general statements in the text. Many years of international research have demonstrated that detailed manpower planning is not a practicable proposition. The results presented in the workbooks should be regarded as indicative of general trends and orders of magnitude, given the assumptions adopted, rather than precise forecasts of what will necessarily happen. For further details, see the *Working Futures 2017-2027: Technical Report*.[10]

As a general rule of thumb, it is not advisable to *publish* any statistics or analyses which are not derived from at least 10,000 individuals. This should provide a reasonable degree of statistical robustness to the estimates whether historic or forecast, and also ensure that you are not in breach of the Statistic of Trade Act 1947.

For *unpublished* analyses, a more lenient criterion can be used. However, the uncertainties associated with projections involving less than 1,000 individuals are probably too great to make such estimates useful. However, there is inevitably some degree of judgement required on the part of the researcher.

ONS recommend using minimum cell sizes of 10,000 (grossed-up) when presenting data based on the LFS.[11] This therefore seems to be a sensible 'rule of thumb' to adopt when *publishing* data from the Workbooks. Given that there are 25 SOC sub-major group occupations to be distinguished in each sector, this suggests a minimum size for a sector of at least 250,000. The sectors chosen as the basis for reporting in *Working Futures 2017-2027*[12] meet this criterion.

However, users of the Workbooks have access to estimates of employment at a much greater level of detail than this criterion would imply. These have been constructed by using the information that ONS publish, including the raw BRES/ABI data (which are subject to frequent revision). Such estimates can provide useful information and intelligence to users about detailed employment levels and trends. However, some caution is required when using such data and there are strict limitations on what can be published by the user due to concerns about confidentiality (see below).

For cases between 1,000 and 10,000 individuals, it is difficult to prescribe general rules, and an element of judgement by the user is needed. At an industry level, and focusing just on employees, the limits set by ONS in publishing BRES/ABI data can be used as a

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[10] Wilson, R. A., M. May-Gillings, S. Patel and H Bui, (2019). *Working Futures 2017-2027: Technical report on sources and methods.* Department for Education.

[11] Strictly, this applies to an individual quarter – and reduces the more quarters are aggregated. This amounts to a figure of around 6000 after aggregating four quarters into data for a year. The 10,000 figure therefore is a conservative estimate of the sample size need for robust estimates.

[12] Wilson, R. A., S-A. Barnes, M. May-Gillings, H. Bui and S. Patel, (2019). *Working Futures 2017-2027: Main report.* Department for Education.

general guide. If ONS do not regard estimates as publishable then the equivalent figures in the workbooks should not be published. Where the focus is on self-employment or on occupations, a more stringent cut-off should be applied.

Thus, in summary, we recommend:

- **for PUBLISHED DATA: Ideally, a minimum of 10,000 individuals per cell**
- **for UNPUBLISHED DATA: A minimum of 1,000 individuals per cell**

Special care is also required regarding publication of any short-term projections. For the reasons discussed in Section 2 of this User Guide, and as explored further in the main *Working Futures 2017-2027* (section 2) report, short-term projections may be especially unreliable and care should be exercised in using them.

Confidentiality

The second aspect is covered by the Chancellor of the Exchequer's Notice under the *Statistics of Trade Act 1947*. This requires that details for individual respondents to government surveys cannot be identified from any published information. In terms of the *Working Futures* Workbooks, the historical basis of the employment forecasts is given by the BRES/ABI data. Thus, in the first instance, users should follow the requirements that the BRES/ABI imposes.

In the *Working Futures 2012-2022: Technical Report*[13] Table 12 presented employment data at the 75 detailed industry classification, for full-time and part-time workers in Great Britain. This provides some indication of the sample sizes involved.

Self-employment is not collected by the ABI/BRES and is derived from the LFS (see *Technical Report* for further information[14]).

Most restrictions on publication arise because there are very few establishments in any particular industry in the LEP. This means that such establishments could potentially be identified.

This is not just a function of employment size. Some of these categories are relatively large in employment terms. In such instances, the small number of establishments involved means that even though they employ quite a large number of people, they can be identified and publication is therefore restricted. In other cases, confidentiality poses no restriction, despite the fact that only a relatively small number are employed, because there are so many tiny establishments involved that this would not identify any particular

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[13] Wilson, R. A., M. May-Gillings, S. Patel and H Bui, (2019). *Working Futures 2017-2027: Technical report on sources and methods.* Department for Education.
[14] Ibid.

one. However, in many other cases the estimates are well below the 10,000 limit recommended above and so any information on changes over time or structure within such totals should be regarded only as indicative.

Such estimates may still be suspect on the grounds of statistical reliability. This caveat becomes even more important when the data are extended to cover additional dimensions such as self-employment and occupation. These rely on data from the LFS which are subject to quite large margins of error. Together, these considerations suggest that considerable care needs to be taken with any estimated employment level below 10,000.

Finally, all the estimates presented in the tables within the Workbooks and in the *Working Futures* reports are rounded to the nearest 1,000. Any estimates of levels or changes below this level should be treated with considerable caution. When focussing on *changes over time* this may result in some estimates being rounded down to 0 in the tables (more detailed figures can be viewed by clicking the increase decimal points icon on the formatting toolbar in Excel). While such changes may be quite large as a proportion of the starting levels, they should still be treated with considerable caution.

8. Status of the projections for LEP local areas

Although concerns about statistical reliability and confidentiality mean that there are significant restrictions on the detailed data that can be reported, this should not be seen as a major constraint on using the material in the Workbooks to develop useful labour market intelligence for local areas and individual sectors.

Often, developments at local level will mirror those at a broader national level. Robust statements can be developed along the lines that there are general national trends (that can be described in detail, based upon *Working Futures 2017-2027*[15]), which are mirrored at a local level (which can be described in more qualitative terms). Where local patterns diverge from the broad national picture more care and judgement is required. In some cases these will reflect differences in local economic and labour market structures. Other supportive evidence can be used to complement the Workbook material. In other cases, the results may simply reflect statistical error and variation, in which case it is inappropriate to read anything into local, regional or UK differences from the 'norm'.

The local level projections are intended as a benchmark, which sets out the implications of local areas maintaining the same patterns of employment change (at a detailed sectoral level), relative to the broader national and regional picture. The local projections do not include any specific local knowledge about how the future may differ from the past. They are essentially static outputs from the Cambridge Econometrics (CE)/Institute for Employment Research (IER) Regional Multi-sectoral Dynamic Macroeconomic Model (RMDM). In order to build in information on locally specific factors a more complete and dynamic economic model is required such as CE/IER's Local Economy Forecasting Model (LEFM). In particular, users interested in performing more comprehensive impact analyses than those accommodated by the Replacement Demand module in the *Working Futures* Workbooks will need to use the more comprehensive options available in the LEFM or similar.[16]

The results from different sets of projections will vary for a whole host of reasons. Most important are the vintage of historical data used, the models adopted and the exogenous assumptions imposed. The cross-sectoral and cross-regional consistency in the *Working Futures* projections is an important advantage in that the local, regional and national pictures are coherent and consistent with each other. However, the *Working Futures* projections will necessarily differ from any alternative projections commissioned from commercial forecasting and consultancy organisations which are likely to be produced using different model assumptions and forecasts.

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[15] Wilson, R. A., S-A. Barnes, M. May-Gillings, H. Bui and S. Patel, (2019). *Working Futures 2017-2027: Main report.* Department for Education.

[16] For example, there is no attempt to incorporate major developments such as large inward investments, or major developments. Individual users will always have more up-to-date, and local, information that they can build into the benchmark projections in the *Working Futures* Workbooks.

9. How do I get more help?

There are a number of ways in which users can get further assistance regarding the Workbooks, ranging from printed documentation to an email helpdesk facility.

The Workbooks are available via the *Working Futures* website:
https://warwick.ac.uk/fac/soc/ier/wf7downloads/

The IER is acting as the main conduit through which the data are distributed. The site contains the relevant *Working Futures* reports and other documents referenced in this guide. Access to the more detailed projections on the *Working Futures* website is restricted to users with permission to use unrounded BRES data.

Website and documentation

The *Working Futures* website contains the following documents in addition to the main Excel workbooks as outlined above) and this *User Guide*.

- *Working Futures 2017-2027: General Guidelines for using the Workbooks* – this document contains detailed information on the contents of each of the Workbooks, together with further discussion of the recommendations for publication. This is probably the best place to start when seeking further information on the Workbooks.

- *Working Futures 2017-2027: Technical Report* – this document has detailed information on the way in which the employment forecasts have been derived. This is the best place to go if you want to know more about the modelling processes which underlie the forecasts, including details of the data and their limitations.

- *Working Futures 2017-2027: Main Report* describes the main findings by sector and occupations, including replacement demands.

- *Working Futures 2017-2027: Headline report* and the related Powerpoint presentation provide an overview of the forecasts and methodology. Headline data for employment rated and GDP are presented along with headline data by sector and the qualification profile of the workforce.

References and referencing

When making reference to the Workbooks, you should use the following form:

"Source: *Working Futures 2017-2027* (2019), DfE/IER/CE, electronic resource."

The *Working Futures 2017-2027* reports and documentation are:

Wilson, R. A., S-A. Barnes, M. May-Gillings, H. Bui and S. Patel, (2019). *Working Futures 2017-2027: Main report.* Department for Education.

Wilson, R. A., M. May-Gillings, S. Patel and H Bui, (2019). *Working Futures 2017-2027: Technical report on sources and methods.* Department for Education.

Wilson, R. A., D. Owen, S-A. Barnes, M. May-Gillings, S. Patel and H. Bui, (2019). *Working Futures 2017-2027: Annexes.* Department for Education.

Wilson, R. A., D. Owen, D Bosworth, S-A. Barnes, M. May-Gillings and S. Patel, (2019). *Working Futures 2017-2027: Headline report (presentation).* Department for Education.

Wilson, R. A., D. Owen, D. Bosworth, S-A. Barnes, M. May-Gillings and S. Patel, (2019). *Working Futures 2017-2027: Interim headline report.* Department for Education.

Wilson, R. A., (2019). *Working Futures 2017-2027: Workbook User Guide.* Department for Education.

Wilson, R. A, (2019). *Working Futures 2017-2027: General Guidelines for using the workbooks.* Department for Education.

Wilson, R. A. and D. Bosworth (2019). *Working Futures 2017-2027 - Qualifications Projections.* Department for Education.