

WORKING FUTURES **2014-2024**

WORKBOOK

USER GUIDE

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WORKBOOK USER GUIDE

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WORKBOOK USER GUIDE

1. 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* project sponsored by the UK Commission for Employment and Skills.

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 sectoral and spatial composition. The projections are available for the period 1990 to 2024 inclusive. Consistent occupational (SOC2010) and industrial (SIC2007) classifications are used throughout the period covered by the Workbooks. The projections take account of data published by ONS from the LFS up to Q2 2011, as well as the 2011 Business Register Employment Survey (BRES)/Annual Business Inquiry (ABI).

It is envisaged that these 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 will probably 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 must be registered to access the data. This requires you having signed the appropriate Chancellor of Exchequer's notice covering access to the BRES/ABI data. If you are unsure whether you have signed the appropriate notice, you should check first by contacting:

UKCES: Peter Glover, UK Commission for Employment and Skills, email: Peter.Glover@ukces.org.uk, tel: 01709 774942

All other enquiries: Rob Wilson, IER, University of Warwick, email: r.a.wilson@warwick.ac.uk, tel: 024 7652 3530

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

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	
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 respondents.	
If in doubt about whether you are covered and what to do with regard to sharing information with partners please contact:	
UKCES: Peter Glover, UK Commission for Employment and Skills, email: peter.glover@ukces.org.uk, tel: 01709 774942	
All other enquiries: Rob Wilson, IER, University of Warwick, email: r.a.wilson@warwick.ac.uk, tel: 024 7652 3530	
Copyright: Warwick Institute for Employment Research / Cambridge Econometrics, 2014	
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 <i>Working Futures</i> Technical Report.	
However, as a general rule of thumb, it is not advisable to publish any statistics or analyses which are not based on data for 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 Act	
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 to make such estimates useful. However, there is inevitably some degree of judgement required on the part of the researcher.	
For cases in between 1,000 and 10,000 individuals, it is difficult to prescribe general rules, and an element of judgement by on behalf of the user is needed. At an industry level, and focussing just on employees, the limits set by ONS in publishing ABI 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.	
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 inappropriate in terms of publishing data from the Workbooks.

When the Workbooks are first accessed, you may be prompted to 'Update Links' (depending on the way in which your particular version of Excel has been installed and configured). You will not need to do this (unless you have previously constructed your own linked Workbooks), and hence the usual response should be

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.

'Do not update'. You may also be prompted to 'Enable macros'.² If you want to use the Replacement Demand module (see Section 5), then macros must be enabled.

² To enable Excel macros if they have been disabled (or if you do not know their current status), once Excel is started, use *Tools > Macro > Security ...* and select *Medium* if this is not already the chosen option. 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 *High* and as a consequence, the replacement demand module and other options will not be available until the user changes the current setting.

2. 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 2014-2024*. Similarly, details of the modelling procedures used to derive the historic and future employment projections can be found in *Working Futures 2014-2024: Technical Report*.

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) × qualification (6 QCF levels) × area (9 English regions plus Scotland, Wales and Northern Ireland) × gender (2) × status (3). In addition results have been produced for LEP and other local areas in Scotland, Wales and Northern Ireland. The different Workbooks simply contain different levels of aggregation of these time series. This is a very detailed database – by far the most detailed ever produced for the UK – and in this respect, the project has generated considerable value-added.

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 as much as 10 years hence. Any errors in the forecasters' ability to predict the 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 effects of the global financial crisis of 2008.

In such circumstances producing robust economic and labour market projections is particularly difficult. The *Working Futures 2014-2024* projections were developed in the second half of 2015. The forecast assumes that, a gradual recovery in confidence will bring about renewed growth in the UK economy, and that will sustain employment growth in the longer-term.

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, even if the recovery were to falter or take place at a faster pace than envisaged here.

3. What Workbooks are available?

The Workbooks have been made available to the UKCES and will be accessed *via* its internal network. The data files will not be available on a public site.

Naming convention for the Workbooks

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

- **XX** denotes the sectoral level of aggregation, using a numeric indicator; and
- **YY** denotes the spatial aggregation, using an area acronym.

XX: Sectoral aggregation

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

- **all YY**.xlsm - All Sectors;
- **6 YY**.xlsm - 6 Broad Sectors;
- **22 YY**.xlsm - 22 Industries (as used for general reporting);
- **75 YY**.xlsm - 75 Detailed IndustSIC2007 2 digit categories except where these are too small to provide reliable data (in which case they have been aggregated together).

YY: Spatial aggregation

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

- **XXUK**.xlsm- the whole of the UK;
- **XXGB**.xlsm- for Great Britain;
- for the 4 countries of the UK (**EN**gland, **WA**les, **SC**otland and **NO**rthern Ireland);
- for the 9 English regions (**LO**ndon, **SO**uth **EA**st, **SO**uth **WE**st, **EA**st of **EN**gland, **WE**st **MI**dlands, **EA**st **MI**dlands, **YO**rkshire and the **HU**MBER, **NO**rth **WE**st and **NO**rth **EA**st); and
- for LEP and other local areas (22 series only except Northern Ireland areas which have 19 industry groupings):
 - 22BC.xlsm covers Black Country
 - 22BU.xlsm covers Buckinghamshire Thames Valley
 - 22CH.xlsm covers Cheshire and Warrington
 - 22CC.xlsm covers Coast to Capital
 - 22CI.xlsm covers Cornwall and Isles of Scilly
 - 22CW.xlsm covers Coventry and Warwickshire
 - 22CU.xlsm covers Cumbria
 - 22DN.xlsm covers Derby, Derbyshire, Nottingham and Nottinghamshire
 - 22DO.xlsm covers Dorset
 - 22M3.xlsm covers Enterprise M3
 - 22GC.xlsm covers Gloucestershire
 - 22BS.xlsm covers Greater Birmingham and Solihull
 - 22CP.xlsm covers Greater Cambridge and Greater Peterborough
 - 22LI.xlsm covers Greater Lincolnshire
 - 22GM.xlsm covers Greater Manchester
 - 22HS.xlsm covers Heart of the South West
 - 22HE.xlsm covers Hertfordshire
 - 22HU.xlsm covers Humber
 - 22LA.xlsm covers Lancashire
 - 22LD.xlsm covers Leeds City Region
 - 22LL.xlsm covers Leicester and Leicestershire
 - 22LV.xlsm covers Liverpool City Region
 - 22LN.xlsm covers London Enterprise Panel
 - 22NA.xlsm covers New Anglia
 - 22NO.xlsm covers North Eastern
 - 22NS.xlsm covers Northamptonshire
 - 22OX.xlsm covers Oxfordshire
 - 22SH.xlsm covers Sheffield City Region
 - 22SL.xlsm covers Solent
 - 22SO.xlsm covers South East
 - 22SM.xlsm covers South East Midlands
 - 22ST.xlsm covers Stoke-on-Trent and Staffordshire
 - 22SN.xlsm covers Swindon and Wiltshire
 - 22TV.xlsm covers Tees Valley
 - 22TB.xlsm covers Thames Valley Berkshire
 - 22MA.xlsm covers The Marches
 - 22WE.xlsm covers West of England
 - 22WO.xlsm covers Worcestershire
 - 22YY.xlsm covers York North Yorkshire and East Riding

- 22WN.xlsm covers North
- 22MW.xlsm covers Mid
- 22WW.xlsm covers South West
- 22EW.xlsm covers South East
- 22AC.xlsm covers Aberdeen City and Shire
- 22AY.xlsm covers Ayrshire
- 22BO.xlsm covers Borders
- 22DG.xlsm covers Dumfries & Galloway
- 22ES.xlsm covers Edinburgh and Lothian
- 22FF.xlsm covers Fife
- 22FV.xlsm covers Forth Valley
- 22GS.xlsm covers Glasgow
- 22HI.xlsm covers Highland and Islands SIP
- 22LS.xlsm covers Lanarkshire
- 22TS.xlsm covers Tayside
- 22WS.xlsm covers West
- 22WL.xlsm covers West Lothian
- 19BE.xlsm covers Belfast
- 19IN.xlsm covers Northern
- 19IW.xlsm covers North West
- 19IS.xlsm covers Southern
- 19IE.xlsm covers South Eastern
- 19IR.xlsm covers South West

The 62 LEP workbooks are detailed above and the main set of 60 Workbooks is detailed in Table 1. In addition there are a number of supplementary Workbooks which are only available for limited geographies.

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	AllUK	6UK	22UK	75UK
	Great Britain	AllGB	6GB	22GB	75GB
	England	AllEN	6EN	22EN	75EN
	Wales	AllWA	6WA	22WA	75WA
	Scotland	AllSC	6SC	22SC	75SC
	Northern Ireland	AllNI	6NI	22NI	75NI
English regions	London	AllLO	6LO	22LO	75LO
	South East	AllSE	6SE	22SE	75SE
	East of England	AllEE	6EE	22EE	75EE
	South West	AllSW	6SW	22SW	75SW
	West Midlands	AllWM	6WM	22WM	75WM
	East Midlands	AllEM	6EM	22EM	75EM
	Yorkshire and the Humber	AllYH	6YH	22YH	75YH
	North West	AllNW	6NW	22NW	75NW
	North East	AllNE	6NE	22NE	75NE
Local Enterprise Partnerships (examples)#	Belfast			19BE*	
	Mid Wales			22MW	
	Aberdeen City and Shire			22AC	
	Leeds City Region			22LD	
	Liverpool City Region			22LV	
	Stoke on Trent & Staffordshire			22ST	

Source: WorkbookNames2016.xlsx.

See previous page for full list.

4. What information do the Workbooks contain?

Each Workbook contains a number of Excel worksheets as shown in Figure 2. The 12 worksheets named 'All' through to 'FemalesSE' in each Workbook contain the basic data for the various gender and status combinations. Each of these worksheets is laid out with the same structure. For example, the 'All' worksheet in 75UK.xlsm (i.e. for the most detailed sectoral disaggregation at the 75 Detailed Industry level, for the whole of the UK) records sectoral and occupational employment projections for 1990 to 2024 in the following structure:

Figure 2: Workbook contents

<i>Warning</i>	Warning on who is entitled to access the data as shown in Section 1 above. By default, each Workbook opens with this worksheet.
<i>A varying number of worksheets containing tables and figures</i>	Worksheets which generate the various tables and figures which are presented in <i>Working Futures 2014-2024</i> . Full descriptions are provided in the <i>Working Futures 2014-2024 General Guidelines</i> .
<i>Replacement QualDemand Assumptions Alt_Assump</i>	Worksheets which allow user-intervention into the forecasting process. Users can change the assumptions underlying the replacement demands by occupation, by choosing to alter the age structure and retirement rates. The implications of the changed assumptions for replacement demand by occupation are presented in charts by SOC major and SOC sub-major groups (see section 5 for details). The implications for replacement demand by qualification appear in Sheet QualDemand.
<i>Info</i>	Forecast identifier and other base information
<i>ShiftShare</i>	Shift-share by occupation, 2004-2024. The worksheet focuses on years 2004, 2014 and 2024 and shows changes between these base/target years (scale effect, occupation effect and industry mix effect - 000s and %). Please note the industry mix differs depending on the industry level of aggregation.
<i>All Males Females FT MalesFT FemalesFT PT MalesPT FemalesPT SE MalesSE FemalesSE</i>	12 basic data worksheets, containing the historic and forecast projections for employment by gender (males, female) and status (FT, PT, SE) for the spatial categorisation covered by the particular Workbook. For each gender and status worksheet, employment projections are presented by sector (as appropriate to the level of sectoral aggregation denoted XX) and for both the 9 SOC major groups and 25 SOC sub-major groups occupational classifications.
<i>A varying number of worksheets from IndAll to Ind75-75 containing qualifications data</i>	Qualification data for use by internal macros, including the Replacement Demand module are stored in these sheets. The sheet name indicates which industry data are stored there. For instance Sheet ind6-3 contains qualifications data for the 3rd industry (Construction) within a 6-series workbook. Since the data are intended for use by macros the layout is not user-friendly.
<i>IndustryAggregation</i>	Details of the industry aggregation used in this workbook

Figure 3: Structure of basic data sheet 'All' for 75UK.xlsm

United Kingdom						
All in employment						
SOC2010 sub-major groups						
All industries	1990	1991	...	...	...	2024
All occupations						
25 SOC sub-major group occupations, from						
11 Corporate managers to						
92 Elementary: admin/service						
Industry 1 of 75 Detailed industries	1990	1991	...	...	...	2024
All occupations						
25 SOC sub-major groups, from						
11 Corporate managers to						
92 Elementary: admin/service						
Industry 2 of 75 Detailed industries	1990	1991	...	...	...	2024
All occupations						
25 SOC sub-major groups						
etc, etc						
... repeated for each detailed industry until						
Industry 75 of 75 Detailed industries	1990	1991	...	...	...	2024
All occupations						
25 SOC sub-major groups						
etc, etc						

The spatial coverage is indicated by the YY classification of the worksheet and can be found in the first row of the worksheet (here 'United Kingdom'). The employment coverage (here 'All in employment') can be found in the second row of the worksheet. Each basic data sheet then contains the employment projections at the sectoral level indicated by the XX classification of the worksheet, for SOC sub-major group and SOC major group occupational classifications.

The Workbooks for the other sectoral (XX) classifications (22UK, 6UK and AllUK) are analogous and only differ according to their sectoral decomposition. This set of workbooks is then repeated for the other spatial (YY) aggregations (4 countries plus GB, the 9 English regions).

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'.³ In contrast, the occupational information relates to responses from households (from the LFS or Census of Population) and is therefore 'residence-

³ 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.

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 small in general.

The estimates take account of the 2013 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).

5. 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 2014-2024: General Guidelines*. Note that while the historical data are available from 1990, the tables and charts tend to illustrate patterns and trends over the three decades from 1994-2024.

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.⁴ 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.

User-customised estimates using the Replacement Demand module

The Replacement Demand (RD) module is self-contained within all the main Workbooks.

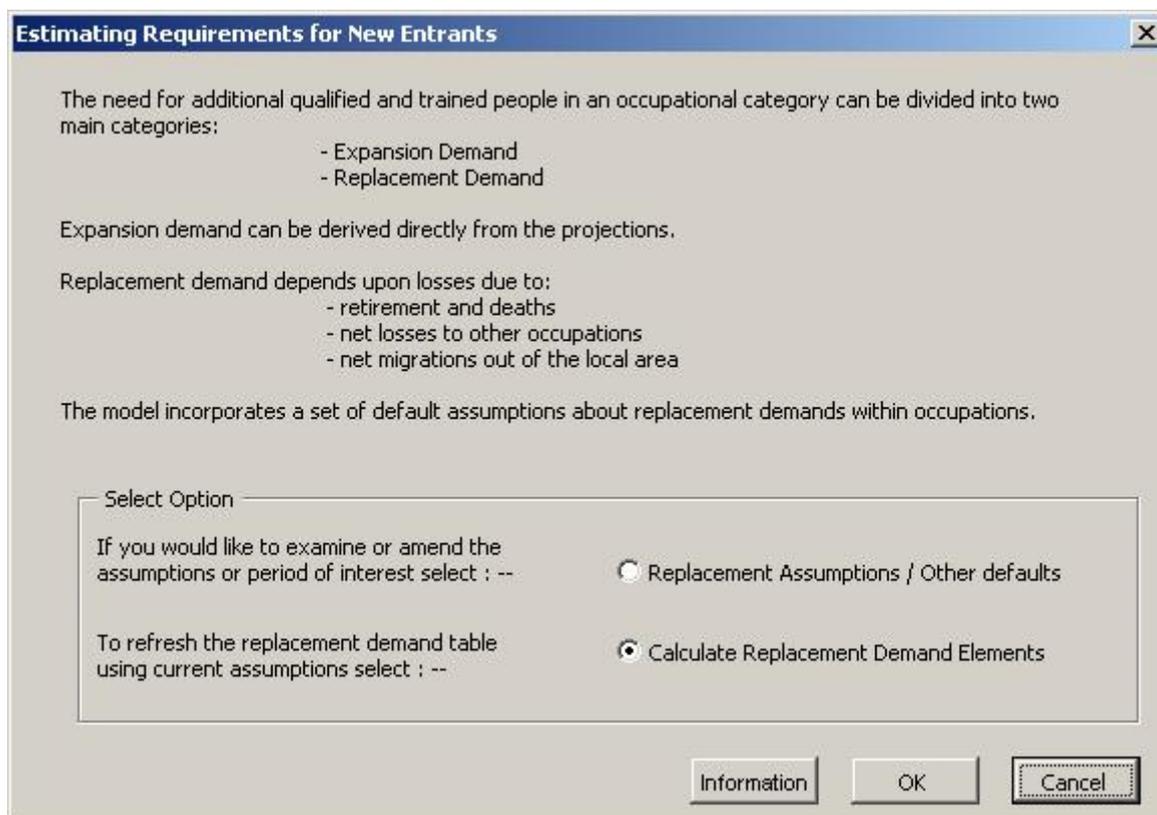
The main replacement demand worksheet (labelled 'Replacement') within each *Working Futures* Workbook provides replacement demand data for all workers, and then for men and women separately, at the 25 SOC sub-major group occupational

⁴ As noted in section 1 above, the existing workbooks already include some links. Users are advised not to attempt to update these when loading the workbooks since they are dependent upon files being located in particular directories.

level. To the right of the replacement demand tables are graphical presentations of the expansion demand and net requirement for SOC major groups and sub-major groups.

Within the main Replacement worksheet, clicking on the *Start* button launches the RD module and brings up the following dialog box:

Figure 4: Replacement demand module – Main Menu



There are two main options. The first selection is to change or to review the assumptions or the period over which replacement demands are to be calculated. The second option (which is initially highlighted as above) is to recalculate the replacement demand estimates, and update the associated charts. The information button provides further details regarding the principles of replacement demand and how the implications are worked out for the novice/uninitiated user). Checking the 'Replacement Assumptions / Other defaults' option followed by 'OK' displays the Assumptions sheet:

Figure 5: Replacement demand module – Assumptions sheet

The assumptions used in calculating replacement demand are stored in this sheet. They may be edited here. It is the users responsibility to check that any changes made to this worksheet are sensible.

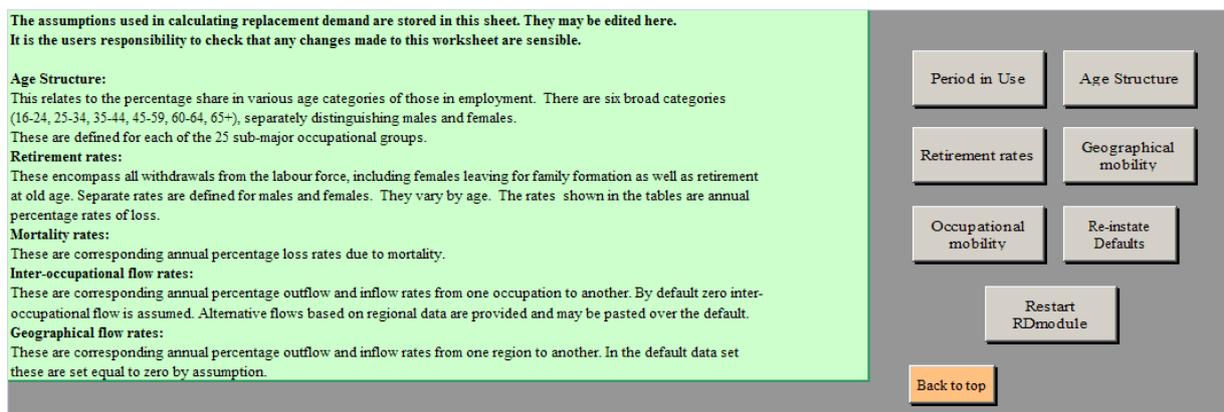
Age Structure:
This relates to the percentage share in various age categories of those in employment. There are six broad categories (16-24, 25-34, 35-44, 45-59, 60-64, 65+), separately distinguishing males and females. These are defined for each of the 25 sub-major occupational groups.

Retirement rates:
These encompass all withdrawals from the labour force, including females leaving for family formation as well as retirement at old age. Separate rates are defined for males and females. They vary by age. The rates shown in the tables are annual percentage rates of loss.

Mortality rates:
These are corresponding annual percentage loss rates due to mortality.

Inter-occupational flow rates:
These are corresponding annual percentage outflow and inflow rates from one occupation to another. By default zero inter-occupational flow is assumed. Alternative flows based on regional data are provided and may be pasted over the default.

Geographical flow rates:
These are corresponding annual percentage outflow and inflow rates from one region to another. In the default data set these are set equal to zero by assumption.



At the top of the sheet, as shown in Figure 5, is some general information about the Assumptions and buttons to assist navigation around the sheet.

By selecting one of the various types of assumption displayed, users can review or edit the assumptions regarding the age structure of the population, retirement rates, mortality rates, occupational and geographical flows. The RD module can then be run from sheet Replacement to recalculate the expansion demands, replacement demands and net requirements, for the sector of interest (or all sectors combined), over the time period requested. The results are displayed in tabular and graphic form.

For example, clicking on the 'Retirement rates' button will display the current assumptions in place regarding the retirement rates of the male and female workforce. Once any changes have been made (for example, incorporating new information regarding earlier retirement patterns perhaps because of a relatively high proportion of public sector workers in the local workforce), the RD module can be run from the Main menu illustrated in Figure 4. Any changes will be saved with the workbook in the usual way. Clicking on the 'Re-instate Defaults' button will overwrite any changes made and will restore the initial default assumptions in their entirety.

As standard, the retirement rate defaults cover every age from 16 to 70, separately for men and women. It is assumed the user will not normally edit these. A separate set of retirement rates by six age groups is provided for the user to edit. To select which set of retirement rates are used by the RDmodule either 'D' (for default) or 'U' (for user) should be entered in the cells indicated at the top of the retirement rates area of the sheet.

The default values used for age structure, retirement rate, and occupational and geographical flows in the *Working Futures* projections vary across occupation and gender but are common to all areas and sectors. This reflects the limitations of data available rather than reality. The prime source for this information is the LFS. While the LFS sample size is adequate to provide such information at an aggregate level, it is not large enough to produce reliable estimates for every individual sector or region. Users are therefore advised to examine the LFS (and other sources) for more specific information on the sectors or geographies and to then substitute such

information for the default values provided in order to generate more customised estimates. The module is designed to facilitate precisely such a process.

Alternative assumptions for age structures, retirement rates and occupational mobility rates based on interrogation of the LFS for the regions are supplied in sheet *Alt_Assumps*. These can be manually copied and pasted into the Assumptions sheet if required. No back-up of these alternative regional rates is stored in the workbook.

When making changes please note that:

- *occupational mobility* in a particular area should be constrained to sum to zero;
- *geographical mobility* can be positive or negative (there may be a net in-flow into or a net out-flow from the area in question);
- you need to make changes separately for *males* and *females*.

Changing the period in use

The period over which the replacement demands are to be calculated can be changed by entering Start Years and End Years in the Assumptions sheet. Note that these should fall within the range of employment data available which is from 1994 to 2024. In general it is the user's responsibility to ensure that sensible changes are made to the assumptions.

Incremental Demand by Qualification

The replacement demand module also provides a qualification dimension to the results.

When the module is run, data from *Working Futures* qualifications datasheets (the final group of sheets in each workbook) are retrieved and the appropriate shares by occupation are applied to the replacement demand occupational totals. The resulting tables and charts can be seen in sheet *QualDemand*.

6. 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 2014-2024: General Guidelines* and, in further detail, in *Working Futures 2014-2024: Technical Report*, some guidelines for publication and for unpublished data analysis are suggested. These are based on 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.

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 2014-2024: Technical Report*.

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. 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 2014-2024* 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/DfES are prepared to 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 focussing just on employees, the limits set by ONS in publishing BRES/ABI 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 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 2014-2024* 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*. Basically, 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 main *Working Futures 2012-2022: Technical Report* Table 12 presents 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).

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 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.

7. What is the status of the projections for LEPs and other 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.

In many cases, 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 2014-2024*), 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 brought in 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 CE/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.⁵

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.

⁵ 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.

8. 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 to the UKCES and key partners and colleagues through the *Working Futures* UKCES website: (<https://workingfutures.ukces.org.uk>)

The UKCES is acting as the main conduit through which the data are distributed. Access to the UKCES *Working Futures* website is restricted to users named on a secondary notice. The site contains the relevant *Working Futures* reports and other documents referenced in this guide.

Website and documentation

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

- *Working Futures 2014-2024: 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 2014-2024: 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 2014-2024* describes the main findings by sector and occupations, including replacement demands.

FAQs and Helpdesk

The website also contains a list of the most frequently asked questions (FAQs) that users have raised concerning the Workbooks (together with their answers). This list will be updated and extended once users begin to access and utilise the Workbooks. Thus you should revisit this site on a regular basis since it is likely that many 'standard' questions will be raised by a number of users and hence quickly find their way onto the FAQ listing.

This can be used to provide technical help on using the Workbooks, and limited guidance and advice regarding publication etc. However, this is not intended to provide assistance on hardware and software issues – such as using Excel, or difficulties with accessing the Workbooks on your server/computer. These should be raised with your IT/computing services manager in the first instance.

9. References and referencing

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

“**Source:** *Working Futures 2014-2024* (2014), UKCES/IER/CE, electronic resource.”

The *Working Futures 2014-2024* reports and documentation are:

Bosworth, D, (2013a) *The Changing Qualifications Mix of the UK to 2020*, 2013. Report produced on behalf of UK Commission for Employment and Skills: Wath on Dearne. Institute for Employment Research, University of Warwick: Coventry.

Bosworth, D, (2013b) *UK Qualifications Projections – Time Series Model: Technical Report*, 2013. Report for UK Commission for Employment and Skills: Wath on Dearne. Institute for Employment Research, University of Warwick: Coventry.

Bosworth, D, (2013c) *Regional Qualifications Projections – Apportionment Model: Technical Report*, 2013, 2013. Report for UK Commission for Employment and Skills: Wath on Dearne. Institute for Employment Research, University of Warwick: Coventry.

Bosworth, D, (2015a) *UK Qualifications Projections – Time Series Model: Technical Report*, 2015. Institute for Employment Research, University of Warwick: Coventry.

Bosworth, D, (2015b) *Four Nations Qualifications Projections – Apportionment Model: Technical Report*, 2015. Institute for Employment Research, University of Warwick: Coventry.

Bosworth, D, (2015c) *Regional Qualifications Projections – Apportionment Model: Technical Report*, 2015. Institute for Employment Research, University of Warwick: Coventry.

Wilson, R, A, I. Woolard and D. Lee, (2004b). *Developing a National Skills Forecasting Tool for South Africa*, South African Department of Labour: Pretoria.

Wilson, R. A., R Beaven and M. May-Gillings (2014). *Working Futures 2012-2022: Technical Report*. UK Commission for Employment and Skills: Wath on Dearne.

Wilson, R. A., R Beaven and M. May-Gillings (2014). *Working Futures 2012-2022: Main Report*. UK Commission for Employment and Skills: Wath on Dearne.

Wilson, R. A., N. Sofroniou, R. Beaven, M. May-Gillings, S. Perkins, M. Lee, (2016). *Working Futures 2014-2024: Main Report*. UK Commission for Employment and Skills: Wath on Dearne.

Wilson, R.A., Mike May-Gillings, J. Pirie and R. Beaven (2016). *Working Futures 2014-2024: Technical Report*. UK Commission for Employment and Skills: Wath on Dearne.