

# **West Dorset, Weymouth and Portland Local Plan Examination**

## **Note from Peter Brett Associates (PBA) Outlining approach taken to Job Forecasts**

Arising in Matter 3



West Dorset District Council and  
Weymouth & Portland Borough Council

## Note on Job Forecasts, Economic Activity Rates and Economic Models

On behalf of **West Dorset and Weymouth & Portland Councils**

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## Document Control Sheet

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# 1 Background

- 1.1 At the EiP Hearing sessions on 25 and 26 November, the Inspector requested a note from PBA outlining the approach taken to job forecasts and how they have been used to inform or test the proposed housing number. The Inspector also asked for a comment on how the PBA/Experian approach differs from that taken by key technical objectors. This is especially relevant because all three economic models now in front of the EiP show a similar ‘headline’ job number – these are shown in the table below. But some objectors suggest many more new homes are needed to support these than PBA/Experian have estimated.

<b>Total Jobs from the three Models for the HMA</b>	
	<b>2011 - 31</b>
<b>Experian (September 2014)</b>	<b>13,640</b>
<i>Experian (775dpa Scenario)</i>	<i>13,070</i>
<b>Cambridge Econometrics</b>	<b>12,800</b>
<b>Oxford Economics</b>	<b>8,300</b>

Source: Experian & Pegasus Planning

- 1.2 We had hoped to prepare a note to assist the Inspector in this matter before the Examination. At the request of various objectors PBA and Experian provided a large amount of detailed data showing how the Experian model balanced jobs and housing prior to the examination<sup>1</sup>. This was circulated to the technical objectors as full Microsoft Excel worksheets several weeks before the examination. The supply of this data was accompanied by an open offer for PBA (and Experian) to answer any questions or clarifications in advance of the EiP.
- 1.3 In return PBA requested a similar set of data from the objectors. The data was requested to confirm the economic models’ population (and so housing assumption) flowing from their model, before objectors used their own demographic software to estimate housing need (using PopGroup or Chelmer). PBA has previously worked with both Oxford and Cambridge and they have previously provided this data when requested.
- 1.4 However this data, which could have been used to prepare a note prior to the examination, was not provided by some objectors<sup>2</sup>. PBA has instead worked with Experian to confirm our understanding of how the competing economic models work.

## Structure of this Note

- 1.5 To respond to the Inspector’s questions this note is in three main parts.
- 1.6 **We firstly, in section 2, give an introduction to the 13,000 job number from the Experian Autumn 2014 model and how it is used in the emerging plan.**
- 1.7 **Section 3 provides a brief commentary on the use of Kent County Council Economic Activity rate assumptions in Chapter 4 of the SHMA.**
- 1.8 **Section 4 provides an overview of the PBA/Experian approach and how it differs from the objectors approach with more detail in Appendix 4.**

<sup>1</sup> The data was subsequently placed into the Examination library in a PDF format– Additional Information from PBA Regarding Technical Assumptions/Data CD/SUS11

<sup>2</sup> Turleys use Experian as their economic model, o additional data was not requested from Turleys. Nexus confirmed Cambridge use SNPP 2012 as their population input. Pegasus provided PBA no data or commentary regarding the two models their analysis relied on. Their representations suggesting that the Cambridge model does not use a population input is contradicted by commentary supplied to Nexus from Cambridge. It was also not questioned at the EiP when raised by PBA.

- 1.9 **Finally section 5 summarises the PBA/Experian findings as they relate to the emergent development plan.**

## 2 Introduction

- 2.1 At the examination a lot of discussion surrounded the various job numbers produced by the three economic models.
- 2.2 At the EiP PBA noted that the jobs suggested by all the models are the product of fully integrated economic models. These models balance both demand and supply factors. The 'headline' job numbers are a product of all these variables working inside the model.
- 2.3 PBA, supported by Experian, suggested that it was not robust to simply take the headline job numbers and apply independent labour market and migration assumptions, which may be at odds with those made by the original economic models.
- 2.4 Experian are not alone in this opinion; Cambridge Econometrics adopted a similar approach when providing forecasts to inform the recent Oxfordshire SHMA (see appendix B).
- 2.5 Appendices A-C attached to this note provide full details of how each model works and how population, housing and other labour market factors are applied in the models alongside demand factors when presenting the 'headline' job number.
- 2.6 **Appendix A shows how the Experian model works in detail.** Experian have confirmed that the population is a fixed input in their model. The most recent (autumn 2014) model assumes population growth in line with the most recent Sub-National Population Projections SNPP (2012)<sup>3</sup> which PBA estimate requires around 554dpa.
- 2.7 **Appendix B details the Cambridge Model.** This also confirms that the population/housing input is fixed. Nexus have confirmed that, as with Experian, the population/housing input is SNPP 2012. So the 13,000 jobs in the Cambridge model also assume only 554 dpa are delivered in the Housing Market Area (HMA).
- 2.8 **Appendix C details the Oxford Model.** Only Pegasus Planning use this model and did not respond to PBA's request for data or clarification. However Oxford have previously supplied to PBA a note detailing their method. This confirms that their approach is different to Experian and Cambridge in that they do not use the SNPP as a fixed population start point. Instead they use their own population model which does not fix the population or labour force. In areas of high labour demand they assume higher rates of inward migration because labour market pressures will attract workers. Conversely in areas of weaker labour market demand workers will migrate elsewhere. We do not know how this link is working in this HMA (because no clarification was supplied to PBA). But the Oxford forecast is the lowest of all the three models considered so it is unlikely to be importing more labour than either Experian or Cambridge.
- 2.9 It is important that these numbers, from any of the three models, should not be confused with the concept of a job target. It is not the purpose of any OAN report to set a job target.
- 2.10 More fundamentally however, there is no suggestion from the models that this number of jobs is 'needed'. The number of jobs expressed are instead the product of the economic models balancing economic potential with the population and labour supply variables. If any of these variables change then the resulting number of jobs may be different.
- 2.11 The Local Plan needs to make reference to this updated evidence, and the councils are preparing 'During Examination Suggested Changes' (SSC2) to address this.

<sup>3</sup> <http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html>



### 3 PBA and the Kent County Council Projections

- 3.1 In Chapter 3 of the SHMA, PBA identified that there was a considerable social and economic risk associated with the continued ageing of the local population. So Chapter 4 of the SHMA ('Demographic projections') PBA tested the profile of the population resulting from the demographic scenarios.
- 3.2 Workforce was used as one measure for this testing because it makes some allowance for older people to be economically active for longer, reflecting increases in state pension ages and also trends for increased life expectancy. It is a more representative and dynamic measure of the population profile than simply looking at the static age structure.
- 3.3 For this testing PBA used an updated set of Economic Activity Rates published by Kent County Council. This effectively replaces a superseded set formally published by the ONS<sup>4</sup>. The use of Kent County Council is however only a rough guide to future economic activity rates and Inspectors elsewhere have accepted that they are likely to be conservative.
- 3.4 PBA recognised that this was only a simple calculation and there was uncertainty surrounding the use of the Kent County Council data. So PBA continued to test jobs and housing in Chapter 5 of the SHMA, working in detail with Experian.
- 3.5 At the examination a number of participants appeared to confuse this demographic analysis with estimates of 'jobs'. This confusion has no basis in Chapter 4 of the SHMA as the term 'jobs' is not used in this chapter; it only uses the term 'workforce'.

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<sup>4</sup> ONS no longer update their EA tables. The former set have been superseded by changes to state pension ages and recent OBR analysis (discussed in Appendix D).

## 4 Why have PBA worked with Experian to test jobs and housing?

- 4.1 PBA have worked with Experian to fully test the links between jobs and housing in the HMA. This was to ensure that the plan's housing requirement, 775 dpa, would not constrain economic growth and job creation; nor would it have negative consequences as discussed in paragraph 19 of the NPPG (Paragraph: 019 Reference ID: 2a-019-20140306).
- 4.2 Due to the integrated nature of all the economic models, on the advice of Experian, PBA considered that the most robust way to test jobs and houses was through the use of the Experian model. This was an alternative to using a third party demographic package which would be divorced from the economic model used to generate the headline job number.
- 4.3 PBA / Experian are not alone in advising this approach. Cambridge Econometrics adopted a similar approach when contributing to the Oxfordshire SHMA (see appendix B).
- 4.4 For this HMA Experian tested their 'baseline' model which assumed housing delivery in line with the SNPP 2012 (554dpa). They also developed a scenario which tested the population in the higher 775 dpa in the emerging plans.
- 4.5 As part of this testing Experian confirmed that:
- **The local economy is not currently constrained by a lack of labour**
  - **554 dpa (in line with the SNPP 2012) is sufficient to support the 'baseline' 13,000 new jobs**
  - **Providing more new homes (and a higher population) does not automatically provide more jobs. This is because the 13,000 in the baseline represents the economic potential of the area's sector structure.**
  - **Providing 775 dpa provides significant 'headroom' which could be used to support more new jobs, through policy interventions for example, or decreased economic activity rates if people choose not to work longer.**
- 4.6 These conclusions are at odds with the views of some objectors. They suggest that many more new homes are needed to support a similar number of new jobs. However none of these alternatives have been tested through the use of a fully integrated model such as Experian. Instead they rely on the use of third party demographic software to 'goal seek' the resulting housing number from the headline job number.
- 4.7 Some of the assumptions made in the demographic modelling used by objectors are not aligned with the original economic model used to generate the job numbers. Most noticeably the models themselves make assumptions about the size of the population, migration flows and the resulting number of new homes.
- 4.8 Other assumptions, such as keeping economic activity rates fixed (Nexus & Pegasus), are not evidenced and run contrary to Government Policy to increase state pension ages. By fixing variables which 'flex' in the economic models, objectors may be exaggerating the extent of migration needed to meet the economist's baseline job numbers.
- 4.9 Appendix D to this note provides additional detail about the potential implication of such modelling choices.

## 5 Summary

- 5.1 **Experian have confirmed that the ‘unconstrained’ (by housing/population) job creation potential of the HMA is currently around 13,000 new jobs over 20 years.**
- This is aligned with the conclusions of the Cambridge model and similar to the (lower) Oxford model.
- 5.2 **Experian have confirmed that this level of new jobs (13,000) can be supported by a lower level of new house building than provided in the Plan (554dpa as opposed to 775dpa)**
- 5.3 **PBA and the Council shared its data and assumptions with the principal objectors prior the examination**
- Objectors were informed that this evidence was being provided as part of the technical meetings around two months before the EiP<sup>5</sup>.
  - Full data from the Experian baseline model was provided to objectors six weeks ahead of the EiP.
  - The data was provided with a brief commentary and an open offer for any questions or clarifications.
  - The opportunity was also provided for objectors to provide similar data from their baseline forecasts ahead of the EiP.
  - However, as recorded in the technical meeting notes, some participants did not provide any additional data relating to the economic forecasts underpinning their housing work.
- 5.4 **By providing for 775dpa, the plan allows considerable flexibility for more jobs to be provided within the proposed housing target, if for example, the economy should further improve.**
- 5.5 **In conclusion, the Councils have further evidenced the conclusion already reached in the Summer 2014 SHMA - that the proposed level of housing does not constrain economic growth and job creation.**

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<sup>5</sup> See meeting notes and the mutual request to share full economic model data.

## Appendix A Experian Method

This appendix includes the March 2014 'Data Note'. The data note fully details how the baseline Experian model works and how population and jobs are linked in the integrated model.

We have included the March 2014 note because it explains how key variables were due to be updated over Summer 2014 as new population and census data was released. (Page 2, 'Population'). This updating explains the shift between the spring and autumn models.

# Data Guide

UK Regional Planning Service  
March 2014



Our main subscription website:

<http://economics.experian.co.uk/>

Our latest views:

<http://www.experian.co.uk/economics/latest-views-weekly-topic-of-focus.html>



# Data Guide

UK Regional Planning Service  
March 2014

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# Executive summary

This document outlines the current variable coverage in the March 2014 version of the UK Regional Planning Service, and the methodology behind the history and forecast.

[Appendix A](#) includes a glossary of terms and [Appendix B](#) includes our definitions of the sectors.

New to this data guide are:

The methodology for our local model in [section 3.3](#)

A list of Frequently Asked Questions in [Appendix C](#)

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# 1 Variable Coverage

**Figure 1.1: Variable coverage in the RPS**

- √ indicates that the variable is available in both the search query tool and the xls files.
- Xls indicates that the variable is available in the xls but not the search query tool.
- UK monthly forecast indicates that the variable is not produced as part of the RPS but can be found in the monthly UK macro forecast on our website.

Variable	UK	Region	County & Local Authority
<b>OUTPUT</b>			
GDP	UK monthly forecast		
GDP by component of demand	UK monthly forecast		
Gross Value Added	√	√	√
GVA by sectors	√	√	√
<b>LABOUR MARKET</b>			
Employees by sector	√	√	√
Self-employed by sector	√	√	√
Government Trainees by sector	xls	xls	Upon request
Her Majesties Forces Total	xls	xls	Upon request
FTE Employment by sector	√	√	√
Total ILO Employment	√	√	√
LFS Unemployment	√	√	√
Unemployment rate	xls	xls	Upon request
Claimant Count	xls	xls	Upon request
Claimant Count rate	xls	xls	Upon request
Labour Force	xls	xls	Upon request
Activity Rate	xls	xls	Upon request
Inactivity Rate	xls	xls	Upon request
<b>DEMOGRAPHICS</b>			
Population Total & Working age	√	√	√
0-16 Age band & Retirement age	xls	xls	Upon request
Population by 5 year age band	Upon request	Upon request	Upon request
<b>HOUSEHOLDS</b>			
Disposable Income	√	√	√
Real disposable income	√	√	√
Income by component	xls	xls	Upon request
Consumer spending	√	√	√
Real consumer spending	√	√	√
Cost of Living Index	√	√	
House price Index	√	√	Upon request
Hours worked	Upon request	Upon request	Upon request
Spending by COICOP category	Upon request	Upon request	Upon request



## 2 Historical End-points

**Figure 1.2: Last historic data point**

Variable	UK	Region	County & Local Authority
Gross Value Added	2013q3	2012q4	2012q4
GVA by sectors	2013q3	2012q4	2012q4
Labour market variables	2013q3	2013q3	All 2012q4 except ILO 2013q3
Income	2013q3	2012q4	2011q4
Consumer spending	2013q3	2012q4	2011q4

The historical end-point represents the last period in time for which we apply our processes to collect, calculate or derive data, details of which can be found in chapter 3: Methodology. All time-periods that are in the past but follow the historical end-point are Experian Economics' estimates.

We have not used any regional data published after February 1st 2014 in producing this update of the RPS. It is possible that between this date and the release of the RPS some history may have changed.

### Population

In order to keep consistency throughout our database, the population data uses the 2010 mid-year estimates and 2010-based population projections. It does not include the 2011 census data or the 2012 national mid-year-estimates. Neither does it include the 2011-interim projections as these assume the same ONS births, deaths and migration assumptions as those which proved wrong in calculating the mid-year estimates pre-census. As soon as a consistent dataset is available from the Office for National Statistics (ONS) and Northern Irish and Scottish Statistical authorities we will switch to these.

### UK forecast

This forecast is consistent with an Experian Economics' February 2014 macroeconomic forecast which includes the national accounts for 2013q3. We explore this further in section 4.

### Geographic boundaries

As communicated in the December 2013 data guide, we have now switched to post-2009 local authority boundaries.

With the ONS gradually phasing out the publication of data on the pre-2009 local authority boundaries, it had become increasingly less credible for Experian to publish up-to-date historical data on these definitions. The table below shows those local authorities which no longer exist as individual entities (2<sup>nd</sup> column) and the name of the new local authority that has been created by their merger.

Region	Disbanded local authorities	Merged to form:
<i>North East</i>	Chester-le-Street, Derwentside, Durham, Easington, Sedgfield, Teesdale, Wear Valley	County Durham
	Alnwick, Berwick-upon-Tweed, Blyth Valley, Castle Morpeth, Tynedale, Wansbeck	Northumberland

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<i>North West</i>	Congleton, Crewe & Nantwich, Macclesfield	Cheshire East
	Chester, Ellesmere Port & Neston, Vale Royal	Cheshire West & Chester
<i>West Midlands</i>	Bridgnorth, North Shropshire, Oswestry, Shrewsbury & Atcham, South Shropshire	Shropshire
<i>East of England:</i>	Mid Bedfordshire, South Bedfordshire	Central Bedfordshire
<i>South West</i>	Caradon, Carrick, Kerrier North Cornwall, Penwith, Restormel	Cornwall
	Kennet, North Wiltshire, Salisbury, West Wiltshire	Wiltshire

## 3 Methodology

### 3.1 UK Methodology

The approach for the regional planning service is one that takes the UK variables as exogenous, imposed from the monthly UK forecast.

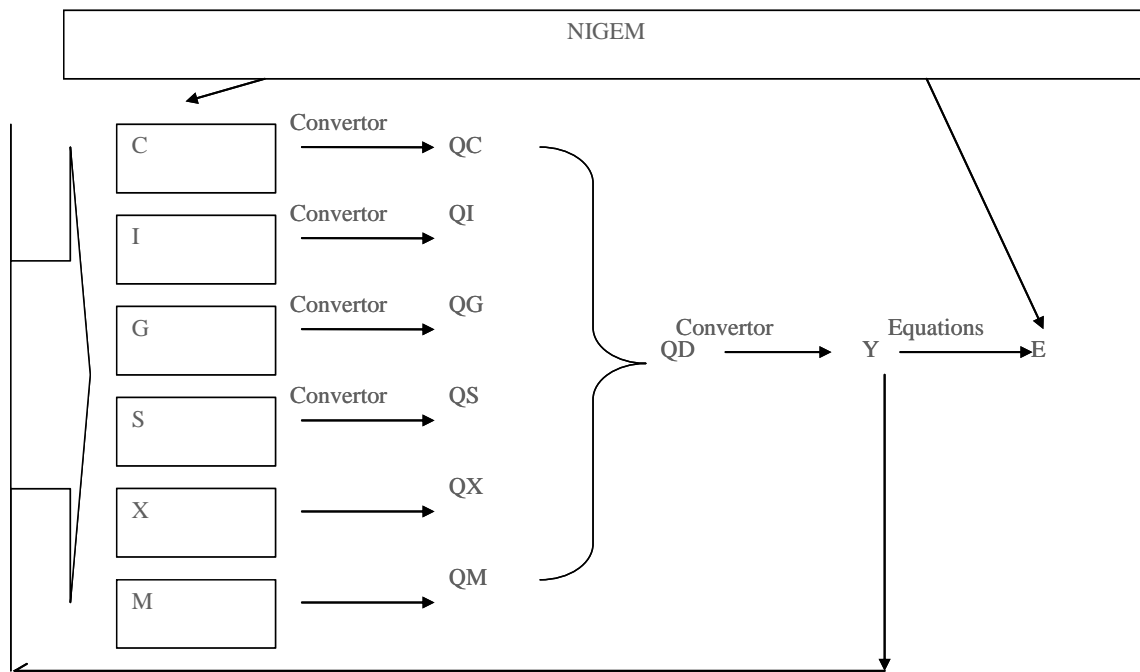
To produce the UK forecast we use a heavily customised version of the National Institute of Social & Economic Research's (NISER) model called NIGEM to provide our core macroeconomic forecast.

NIGEM is a general equilibrium model of the UK and World economy which forecasts, amongst other things, aggregate output, expenditure, income and employment based on the UK National Accounts published by the Office of National Statistics.

To split this core forecast out into industries and sub-sectors we have a Sectoral Model which expands on the forecasts from the core NIGEM model.

We disaggregate total consumption (C), investment (I), government spending (G), stocks (S), exports (X) and imports (M) from the NIGEM to a finer level of detail providing a highly detailed model of demand (Q) for industry output in the UK economy. Using convertors derived from the ONS Supply and Use Tables, we convert this demand into output by SIC category (Y) and constrain to forecast total output from NIGEM. This Input-Output based model is iterative and captures intra-industry demand.

The industry output forecast is used together with wage forecasts to forecast employment by sector (E).



## 3.2 Regional methodology

### 3.2.1 History

All economic history used in the RPS is derived from official statistics published by the UK's Office for National Statistics (ONS). Our approach is to use existing statistics in the form they are published to the greatest extent possible. However, this is subject to the following exceptions:

- where there is a lag between an update of aggregate data and the corresponding disaggregation, the disaggregate data is constrained to match the latest aggregates;
- where ONS data is not published at quarterly frequency (for instance it is only annual data), we use a consistent methodology (described below) to construct quarterly data;
- where ONS data is not published at the geography required or in the detail required, we use a consistent methodology to add the necessary data ensuring that it constraints to published data at a higher level of geography or detail;
- on occasion, where ONS data is internally inconsistent we apply techniques to remove these inconsistencies.

The most timely and reliable data at the regional level is the workforce jobs series, published on a quarterly frequency by the ONS. Employee jobs, self-employed jobs and government trainees are published at the level of the SIC 2007 Section providing us with 22 sectors.<sup>1</sup> In order to disaggregate this Section-level data to 2-digit sectors from which we can construct the Experian 38 sectors we use official survey data:

- In the case of employee jobs, we use the Annual Business Inquiry (ABI) and Business Register & Employment Survey (BRES). These are annual surveys which are not updated after being published – further the methodology has changed over the lifetime of these surveys. We apply a principled set of rules to derive consistent employee job shares within the Sections from the surveys.
- The March 2014 RPS uses the 2013 BRES, which provides data up to 2012. A new BRES will be published at the end of 2014 and will provide data up to 2013. Pre-2010 we have made a working-owners adjustment, based on an overlapping year only published by NOMIS in February 2013, in line with their recommended techniques for dealing with discontinuities.
- In the case of self-employed jobs, we use data from the Labour Force Survey (LFS).

Workforce jobs is the sum of employee jobs, self-employed jobs, government trainees and Her Majesty's Forces (who are assigned at the sector level to Public Administration and Defence.)

To estimate full-time equivalent employment (FTE), we use data on hours worked in each sector and region derived from the Annual Survey of Hours and Earnings (ASHE). ASHE is also used to derive wage data for each region and sector.<sup>2</sup> We also use, for this purpose, compensation of employee data from the regional accounts.

GVA measured on the income basis is published in the regional accounts at an annual frequency in current prices. Total GVA lags the latest complete year by 12 months while the industry detail lags by a further year. (i.e. the regional accounts published in December 2013 contained GVA by region up to and including 2012 with industry detail up to and including 2011). With the exception of manufacturing,

<sup>1</sup> The ONS has ceased publishing official 2-digit employee jobs data for the regions. The approach we have taken is consistent with the approach recommended by the ONS to derive 2-digit estimates.

<sup>2</sup> We do not routinely publish sector level wage forecasts; however, it is available on request.

the industry detail is only at the section level. Beginning with the December 2013 Regional Accounts (which were first incorporated in the March 2014 RPS), manufacturing GVA is available at the sub-section level. To construct the Chain Volume Measure data we require we follow these steps:

- the data is disaggregated and made quarterly using workforce jobs data;
- the data is deflated at the industry level using the UK deflators for the industries;
- the data is aggregated to produce a regional total – this implicitly creates a regional deflator by taking into account the different weightings of industries within a region.

Beginning with the December 2013 Regional Accounts, the ONS has published experimental alternate GVA accounts on the production basis; these accounts include an estimate of CVM GVA for the regions. We have not incorporated these data for the reasons given in the FAQs (Appendix C.)

Income is published in the regional accounts on an annual basis with a full breakdown of income sources and deductions. Income sources are:

- compensation of employees : wages and salaries *plus* employers social contributions
- self-employment income
- Net Property Income : made up of property income received *less* income paid
- transfers from the State (i.e. benefits)
- other Transfers

Income deductions are:

- taxes
- social contributions
- transfers to others

The sum of income sources *less* income deductions constitutes disposable income. To convert this annual data to quarterly jobs we use (depending on the component) employee jobs, self-employee jobs or the UK quarterly pattern. We constrain these quarterly series to the official UK published data. Real disposable income is obtained by deflating disposable income by the consumer price deflator.

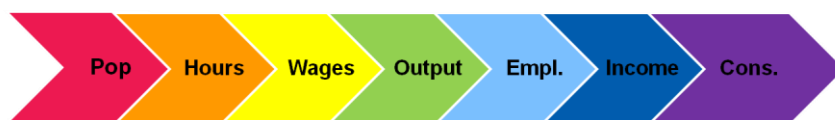
Household spending is derived by sharing out UK nominal expenditure using regional shares of expenditure reported in the Living Costs and Food Survey by type of expenditure. Nominal regional spending is deflated by published UK deflators and then aggregated to produce a regional total. This again implicitly creates a regional cost of living measure which we also publish.

Population projections are obtained from the ONS (2010 projections) and spliced onto the 2010 mid-year-estimates, constrained to the latest GAD projections. We have explained above our policy on the introduction of newer population data (see Section 2). The working-age definition incorporates all announced future changes in the state pension age (for example the different sliding retirement age for men and women).

### 3.2.2 Forecast

The regional model is solved sequentially. Each variable in the sequence is dependent only on variables earlier in the sequence and not variables later in the sequence. The sequence is divided into sections.

The first is the core, which produces totals for each region for each variable:



Population projections are a key driver in the forecast. These help determine hours worked in a region, which feed into output, compensation, employment in all its forms, income and finally spending. In each case we forecast shares of the corresponding UK variable for each region and then share out the UK variable to the region.

The second sequence is the detailed, which produces forecasts for each industry:



In each case, we forecast shares of the region within the UK industry. We then share out the UK industry data subject to the constraint of the total that has already been determined and the UK total.

### 3.3 Local methodology

#### 3.3.1 History

As at the regional level, all local economic history used in the RPS is derived from official statistics published by the ONS. Our approach to using this data is identical to that given above at 3.2.1. However, data at the local level is more likely to be incomplete<sup>1</sup> or inconsistent<sup>2</sup> than is the case at the regional level. For this reason, there is greater call for the application of techniques to construct missing data and to remove inconsistencies than is the case at the regional level.

In all cases, local area data in a particular region is constrained to match the regional total for the same variable. This has two particular advantages:

- Local data is made consistent with regional data of the same vintage.
- Where local data has been estimated or constructed, the regional data ensure that the estimates together are consistent with more reliable data.

The ONS do not publish a workforce jobs series at the local level. Accordingly, we construct workforce jobs series for each local area using BRES/ABI in the same way that BRES is used at the regional level to disaggregate section estimates. The BRES share for a particular industry of a local area in its parent

<sup>1</sup> For some local areas, publication of certain data by the ONS is restricted because to do so would effectively disclose individual responses to ONS data-collection surveys (e.g. if there are only one or two firms in a certain industry in a particular locality.)

<sup>2</sup> In some cases, sample sizes in ONS data-collection surveys at the local level are very small. This leads to data of comparatively poor quality and relatively high volatility.

region is used to disaggregate the regional workforce jobs series for that industry. As BRES is a survey, the figures over time for a particular local area industry combination can be volatile<sup>1</sup>. Further, certain years' results may be withheld to prevent disclosure of confidential data. Accordingly, to obtain sensible data it is necessary for us to smooth out this volatility and to interpolate over the gaps.

At the local level, the most timely and comprehensive data are ILO data for residence and workplace-based employment and unemployment data on both the ILO<sup>2</sup> and claimant count basis. These data is obtained directly from NOMIS.

Regional accounts data is provided at sub-regional level for both GVA and income as it is at the regional level. The same methods are used at the local level as at the regional level to process these data. However, sub-regional data is only published for NUTS2 and NUTS3. Since not all local authorities constitute a NUTS3, it is necessary to disaggregate these data to local level. Further, the data provided at NUTS3 are less comprehensive than those provided at NUTS2<sup>3</sup>. We make use of this NUTS2 data by constraining our disaggregated NUTS3 estimates to their parent NUTS2. We then disaggregate these constrained NUTS3 data to local data<sup>3</sup>.

In the case of GVA, the data provided at NUTS2 is at the section level with sub-sectional data for manufacturing. For NUTS3, several sections are aggregated. In particular, there is less detail in the service sectors. Disaggregation (of industrial data and from NUTS3 to local data) takes place using workforce jobs data at the industry level.

In the case of Income, the data provided at NUTS2 has the same level of detail as at the regional level. For NUTS3, only primary and secondary income estimates are provided. NUTS2 data is disaggregated to NUTS3 using employee jobs (in the case of compensation of employees), self-employed jobs (in the case of self-employment income), unemployment (in the case of government benefits) and the regional split (in any other case.) These estimates are then constrained for each local to the primary and secondary income estimates provided. Disaggregation from NUTS3 to local level takes place using employee jobs, self-employed jobs, unemployment or population.

No estimates of household spending are provided at the local level. Household spending is, therefore, derived by using the share of local disposable income in regional disposable income.

### 3.3.2 Forecast

The local authority model is run separately for the local authorities in each region and takes the regional forecast as given. Accordingly, as with local history, local forecasts are constrained to the regional forecasts of the parent region.

Our local model is based on the resolution of demand and supply for labour and takes into account commuting between local areas within a region and across the regional boundary. The properties of the model are these:

- When unemployment is low, labour supply growth is the key determinant of growth.
- When unemployment is high, growth in demand for labour is the key determinant of growth.
- As unemployment decreases,
  - Labour supply growth becomes relatively more important
  - Growth in demand for labour becomes relatively less important
- An area's workplace employment growth depends on labour supply not only in the area but also

<sup>1</sup> The volatility represents sampling variability rather than actual volatility in the population data.

<sup>2</sup> In line with ONS guidelines, we use the official model-based estimates of local unemployment that are more accurate than survey data which suffers from volatility.

<sup>3</sup> NUTS2 is provided at the same level of detail as NUTS1 (i.e. regional) level.

labour supply growth in other local areas in the region from which it has historically drawn inward commuters.

- Its historic share of incoming workers across the regional boundary.
- An area's residence based employment growth depends on demand for labour not only in the area but also
  - Growth in demand for labour in other local areas in the region to which it has historically supplied commuters.
  - Its historic share of outgoing workers commuting across the regional boundary.
- Workplace based employment drives GVA growth.
- Residence based employment drives Income and, accordingly, spending growth.

The starting point is an estimate of labour force growth in a local area. Growth in the labour force is determined primarily by growth in the working age population. However, the econometric equation linking labour force and working age population takes into account trends in the participation rate for each local area.

In parallel, demand for labour is estimated. This is done at the industry level by linking job growth<sup>1</sup> in a local area to growth in the same industry at the regional level and then constraining demand for jobs by industry to demand for jobs for the same industry at the regional level. The effect of this is:

- Demand for jobs at the local level is fastest in those industries which are performing best at the regional level.
- Total demand for jobs at the local level depends on its industrial structure. Those local areas which have a more than proportionate share of the best performing industries will perform best overall.

The supply and demand for labour is then resolved in the following way:

- Total demand<sup>2</sup> for jobs for each local area is converted into demand for workers according to the historic ratio between jobs and workers into that local area.
- The inflow and outflow of workers across the regional boundary is shared out between local areas according to their historic commuting patterns leading to an adjustment in
  - The remaining demand for labour for a local area (*inflow*)
  - The remaining available labour for a local area (*outflow*)
- Workplace demands for workers are converted into residence-based demands according to historic commuting patterns.
  - If unemployment is sufficiently high, these demands are satisfied out of the growth in the labour supply and the pool of available (unemployed) workers.
  - If unemployment is sufficiently low, these demands can only be satisfied out of the growth in the labour supply.
  - If unemployment is above its lower bound but not too high, a proportion of demands are satisfied out of the pool of available workers and the rest are satisfied out of the growth in the labour supply.
  - The model makes short-term adjustments in the labour supply in response to demand conditions to reflect the economic reality that
    - When demand is high, the participation rate rises as potential workers are drawn into the labour force by the relatively buoyant conditions;
    - When demand is low, the participation rate declines as disillusioned workers leave the labour force because of the poor job market conditions;
  - The unemployment rate, accordingly, behaves as expected.

<sup>1</sup> Separately for employee jobs, self-employee jobs, government trainee jobs and Her Majesty's Forces.

<sup>2</sup> i.e. all industries and job types aggregated.



- The satisfied residence supply for labour is converted back into workplace demands and workplace based employment is calculated for each local area. This is then converted back into jobs and used to produce final workforce jobs estimates for each local area.

The consequence of this is that:

- Local areas with high demand may not see all of that demand satisfied if there is insufficient available labour supply to meet those needs. Jobs growth will, accordingly, be slower.
- Local areas with high labour supply may not see higher growth in residence employment if there is insufficient demand for labour to use it up.

GVA growth is then forecast based on growth in workplace-based employment according to equations which link GVA growth to workplace-based employment. Income is forecast by component based on residence based employment (in the case of compensation for employees or self-employment), unemployment (in the case of benefits) and population in any other case. Spending depends on income by component.

## 4 Key changes since December 2013 RPS

### 4.1 UK forecast

The December RPS forecast was consistent with the October UK macro. Between the two UK forecasts, there were few historical revisions to the following indicators:

**GDP** has been revised back to 2012 and it is now slightly stronger, the main contribution came from **consumption** data which has been also revised up. We have therefore upgraded our forecast for 2013 slightly. The labour market has continued to create jobs and the unemployment rate is now expected to dip below 6.3% in 2015, triggering a rise in the Bank of England base interest rate.

There have been some revisions to our long-term profiles for GVA in certain industries, notably an upgrade to Wood & Paper and downgrades to Pharmaceuticals, Machinery & Equipment and Other Private Services.

ONS has revised estimates of **workforce jobs** back to 1981. There have been substantial downward revisions to estimates from 2012 and smaller revisions to earlier time periods back to 1981. These revisions have been caused by benchmarking to the latest estimates from the annual Business Register and Employment Survey (BRES), updating seasonal factors and taking on board late information. **Public sector employment** has also been revised back to the start of the time series in 1999. These revisions take account of late information, updates to seasonal factors, and re-referencing of survey estimates.

ONS has also revised estimates of **Average Weekly Earnings** back to the start of the time series in 2000 resulting from the annual review of the seasonal adjustment process.

*March RPS forecast. Previous forecast (Winter 2013) in brackets.*

UK	2012	2013	2014	2015	2016-2023	2024-2031
GDP growth	0.3% (0.1%)	1.9% (1.4%)	2.6% (2.1%)	2.5% (2.1%)	2.5% (2.4%)	2.4% (2.4%)
Workforce Jobs growth	0.9% (1.9%)	1.3% (1.3%)	1.4% (1.2%)	1.0% (0.9%)	0.7% (0.7%)	0.7% (0.7%)
Unemployment rate	7.9% (7.9%)	7.6% (7.7%)	6.8% (7.4%)	6.3% (6.9%)	5.2% (5.9%)	4.0% (4.7%)
Real Income growth	2.3% (1.5%)	-0.1% (-0.1%)	2.0% (1.1%)	1.9% (1.6%)	2.3% (2.2%)	2.5% (2.4%)
Spending Volumes growth	1.2% (1.5%)	2.4% (1.8%)	2.7% (1.9%)	2.6% (2.0%)	2.4% (2.4%)	2.3% (2.3%)
House price growth	1.7% (1.7%)	4.2% (3.5%)	7.6% (5.1%)	6.6% (4.8%)	3.5% (3.6%)	3.6% (3.5%)

GDP growth came in at 0.7% q-on-q in the final quarter of 2013, in line with our expectations based on a continuation of very positive anecdotal evidence and official data in recent months. This rise took the increase in the year to 2013q4 to a healthy 2.8%.

Employment is responding positively to output trends. Almost 450,000 net new jobs have been added over the past year and the unemployment rate has fallen from 8.3% at end-2011 to 7.2%. Average weekly earnings including bonuses rose by 1.4% compared with a year earlier.

The marked improvement in the economic outlook will mean that interest rates will need to rise earlier than the Bank's initial forward guidance date of 2016. We assume that mid-2015 will see the beginning of an upward phase in the rate cycle.

The UK economic recovery seems firmly entrenched as the flow of strong data that has emerged over the past year continues to outweigh weaknesses and defy the headwinds that seemed likely to constrain expansion. Buoyant services, manufacturing and construction. If weakness in the eurozone economy persists for much longer than expected in the base case, UK exports will remain constrained with net trade becoming a serious drag on growth in the next few years.

## 4.2 Regional Forecast

Given revisions at the UK level to which our regional data is constrained, the only changes to the history can be traced back to the following new data:

- New regional accounts
- More detailed manufacturing split at regional level published for the first time by ONS
- Regional Workforce Jobs 2013q3.

We have not yet included the revised population mid-year estimates or new population projections as discussed in section 2.

*March RPS forecast:*

Regional forecast 2016-31 ave. growth	SW	SE	GL	ET	EM	WM	NW	NE	YH	SC	WA	NI
GDP	2.3%	2.7%	2.9%	2.5%	2.3%	2.1%	2.2%	2.0%	2.2%	2.2%	2.1%	2.0%
Workforce Jobs	0.7%	0.9%	1.0%	0.8%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%	0.6%
Unemployment rate	3.4%	3.2%	6.3%	3.6%	4.9%	6.7%	4.3%	6.6%	4.5%	4.4%	4.5%	4.1%
Real Income	2.4%	2.6%	2.7%	2.6%	2.3%	2.0%	2.1%	2.1%	2.0%	2.0%	2.0%	2.0%
Spending Volumes	2.1%	2.6%	3.0%	2.5%	2.2%	2.1%	2.1%	1.9%	2.0%	2.0%	1.9%	2.0%
House price	3.7%	4.1%	4.7%	4.0%	3.2%	3.1%	3.1%	2.3%	3.0%	3.2%	2.9%	2.6%

### 4.3 Local Forecast

In addition to a constraint imposed by new UK and regional history, the local authority history has changed in the current RPS round. Please see Section 3.3 for more detailed information.

## 5 A note from the ONS on volatility

A change in methodology behind Office for National Statistics (ONS) employment surveys has produced widespread volatility in the historical data, particularly from 2010.

The following is an explanation directly from the ONS:

“A fundamental redevelopment of Workforce Jobs sources, classifications, methods and systems was recently undertaken and is explained clearly in the article ‘Revisions to Workforce Jobs’ (Barford 2010). One of the key changes highlighted in this article was the replacement of a matched-pairs estimator with a point-in-time ratio estimator, ONS’s standard method. This change was aimed at removing the bias caused by the matched-pairs method. A matched-pairs method tends to underestimate change over time, as it excludes the births and deaths of businesses in the sample. In essence, only those businesses sampled in two consecutive periods are used to produce estimates of change. This bias used to cause large revisions when the short-term employment surveys series were benchmarked retrospectively to Business Register Employment Survey (BRES) estimates. BRES is an annual survey which selects a larger sample and also uses a point-in-time ratio estimator. The point-in-time estimator includes all sampled businesses in each and every period, which reduces the bias over-time. The trade-off is an increase in volatility caused by the inclusion of the rotated part of the sample for small and medium sized businesses. Sample rotation spreads the administrative burden; ensuring businesses are selected for a limited number of periods.

Unfortunately, the volatility of regional estimates at an industry level has been far greater than anyone anticipated and in general has been met unfavourably by users, particularly those that are interested in regional data. There are a number of instances, for example, whereby businesses have been ‘rotated in’ to a particular region and served to distort the level of jobs for a particular industry, usually for a period of 5 quarters, which is the time a rotated business remains in the sample of the STES.”

Regional employment is the most timely and only source of quarterly data at this level of geography and is used to derive the quarterly profile of other variables in our regional models. Therefore this volatility is reflected in output as well as employment.

# Appendix A....Glossary of terms

## Glossary of terms

**Gross Domestic Product (GDP)** Total work done in an economy in a period measured in one of three ways:

- Output Measure: Output of all goods and services less inputs
- Income Measure: Income earned by all parts of the economy
- Demand Measure: Demand for goods and services comprised of
  - Expenditure by Households, NPISH and Government
  - Investment (Gross Fixed Capital Formation) by business and Government
  - Changes in Inventories and Acquisitions less disposals of valuables
  - Exports less imports

GDP is measured in market prices: this means that the prices used to convert output of goods and services into money include taxes and subsidies by the government. Distributors' margins are credited to the industry producing the goods and services not to the distribution industry.

**Gross Value Added (GVA)** GVA is identical to GDP except that it is measured in basic prices. These prices do not include taxes and subsidies imposed by the government. Distributors' margins are credited to the distribution industry. GVA for an industry is described by either of the following identities:

- GVA is identical to output of the industry less inputs of the industry
- GVA is identical to the sum of
  - Compensation of Employees in the industry
  - Gross Operating Surplus (i.e. profit) earned by capital in the industry

When looking at GVA for an industry, it is important to realise that it only includes the output of that industry (i.e. the value added by that industry.) For example retailing GVA only includes the value added by retailers (e.g. customer service etc).

GVA in the RPS is measured by the place where the work is done (workplace based) and not where the worker resides.

**Current Price / Chain Volume Measure** Data where the unit of measurement is money are available either in Current Price (or Nominal) terms or CVM (or Real) terms. The distinction is important because the buying power of money changes over time. For current price data, no adjustment is made for this fact. CVM data adjusts all figures in a time series to be consistent with the buying power of money in a given year (the reference year). Current Price data, thus, measures values while CVM data measures volumes. For example, Current Price GDP is the money value of production in a given period while CVM GDP is the amount of production. For years before the reference year, CVM data is not additive (thus the sum of GVA for all sectors will not equal total GVA.) In all other years, CVM data is additive.

**Productivity** A measure of efficiency calculated by estimating output per unit of input

**Workforce Jobs** A count of the total number of jobs in the UK, a region or industry. It is comprised of

- Employee Jobs: The number of jobs where the occupant is an employee.
- Self-employee Jobs: The number of jobs where the occupant is self-employed
- Government-Sponsored Trainees: The number of jobs where the occupant is on a government training scheme.
- Her Majesty's Forces: The number of jobs in the armed forces (part of Public Administration & Defence).

Workforce jobs and all its components count jobs and not people. This means that where a person has two or more jobs they are counted once for each job that they have. This can be contrasted with the ILO employment measures. Another consequence of counting jobs is that Workforce Jobs is based on the place of work not the residence of the worker

**Full Time Equivalent Employment:** Our definition is based on total hours worked and is as follows:

$$\text{FTE} = (\text{HOURS}) \text{ divided by } (37.8 \times 13)$$

Here a constant yard-stick of full-time employment for all industries, regions and industry-region based on thirteen working weeks in a quarter at 37.8 hours a week. 37.8 hours is the average hours worked by a full-time worker in the UK between 1990 and 2009.

**LFS/ILO Employment** The International Labour Organisation (ILO) provides an international standard method of measuring employment. In the UK this is implemented by means of a survey known as the Labour Force Survey (LFS) or Annual Population Survey (APS). This measure is based on the place of residence of the employee. It is a people count based on the main job that a person has. Employment comprises:

- Employees: People whose main job is as an employee.
- Self-employed: People whose main job is as a self-employed person.
- Government-Sponsored Trainees: People whose main job is on a government training scheme.
- Unpaid Family Workers: People whose main job is as an unpaid worker in a business owned by their own family.

**ILO Unemployment** The International Labour Organisation (ILO) definition of unemployment covers people who are: out of work, want a job, have actively sought work in the previous four weeks and are available to start work within the next fortnight; or out of work and have accepted a job that they are waiting to start in the next fortnight

**Labour Force / Economically Active** The sum of ILO Unemployment and ILO Employment. That is all people who are in work or who are looking for a work. A person who is in the labour force is said to be Economically Active.

**Economically Inactive** A person who is not economically active. The principle categories are retirees, students, children, long-term sick or disabled, homemakers and carers.

**Claimant Count Unemployment** Measures the number of people who are claiming Jobseekers' Allowance. This is always less than ILO Unemployment because not everyone who is ILO unemployed is eligible to claim JSA and not all who are eligible claim. One particular case that is important is people whose partners work more than 16 hours a week; they cannot claim JSA but may be ILO unemployed.

**Extra Regio** In addition to the 9 English regions and the nations of Scotland, Wales and Northern Ireland, the UK's economic boundary includes the continental shelf and UK government operations abroad (i.e. embassies and HMF abroad). The ONS does not assign income or GVA attributable to these sources to any region or nation. Therefore, the sum of regional Income or GVA does not equal the UK. This also impacts on two industries Extraction & Mining and Public Administration & Defence.

**Working Age Population** Population above the age of 15 but below the current retirement age for their gender.

**Retirement Age Population** At present this includes males over 65 and females over 60, although this will change post 2010 as new female and male retirement ages are gradually phased in. Our forecasts take account of this proposed change in retirement legislation

**Household Consumer Spending** The accounts relate to consumption expenditure by UK resident households, either in the UK or the rest of the world. Spending by non-residents in the UK is excluded from the total

Household consumption includes goods and services received by households as income in kind, in lieu of cash, imputed rent for the provision of owner-occupied housing services and consumption of own production

For national accounting purposes, households are individuals or groups of people sharing living accommodation

**Household Disposable Income** Household disposable income is the total payment to households (from wages, interest, property income and dividends) less taxes, social security, council payments and interest

**Cost of living index** Regional consumer spending deflator. Gives an indication of how the value of consumer spending has grown in comparison to the volume.

**NUTS (Nomenclature des Unités Territoriales Statistiques – Nomenclature of Territorial Units for Statistics)** A European Union standard for classifying the subdivisions of member states. In the case of the UK, the English regions and the three nations are classified as NUTS1. The next level – NUTS2 – typically consists of aggregations of local authorities in the same region. The level below that, NUTS3 consists either of single local authorities or a small aggregation of local authorities in the same NUTS2. In Scotland, some local authorities are divided between NUTS3. NUTS4 and NUTS5 also exist but are not used in the RPS.

# Appendix B...Sector definitions

## Sector definitions

Experian 38-sector	SIC-2007 division	Falls within Experian 12-sector
Agriculture, Forestry & Fishing	01 Crop and animal production, hunting and related service activities	Agriculture, Forestry & Fishing
	02 Forestry and logging	
	03 Fishing and aquaculture	
Extraction & Mining	06 Extraction of crude petroleum and natural gas	Extraction & Mining
	05 Mining of coal and lignite	
	07 Mining of metal ores	
	08 Other mining and quarrying	
	09 Mining support service activities	
Food, Drink & Tobacco	10 Manufacture of food products	Manufacturing
	11 Manufacture of beverages	
	12 Manufacture of tobacco products	
Textiles & Clothing	13 Manufacture of textiles	
	14 Manufacture of wearing apparel	
	15 Manufacture of leather and related products	
Wood & Paper	16 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	
	17 Manufacture of paper and paper products	
Printing and Reproduction of Recorded Media	18 Printing and reproduction of recorded media	
Fuel Refining	19 Manufacture of coke and refined petroleum products	
Chemicals	20 Manufacture of chemicals and chemical products	
Pharmaceuticals	21 Manufacture of basic pharmaceutical products and pharmaceutical preparations	
Rubber, Plastic and Other Non-Metallic Mineral Products	22 Manufacture of rubber and plastic products	
	23 Manufacture of other non-metallic mineral products	
Metal Products	24 Manufacture of basic metals	
	25 Manufacture of fabricated metal products, except machinery and equipment	
Computer & Electronic Products	26 Manufacture of computer, electronic and optical products	



	27 Manufacture of electrical equipment	
Machinery & Equipment	28 Manufacture of machinery and equipment n.e.c.	
Machinery & Equipment	29 Manufacture of motor vehicles, trailers and semi-trailers	
	30 Manufacture of other transport equipment	
Other Manufacturing	31 Manufacture of furniture	
	32 Other manufacturing	
	33 Repair and installation of machinery and equipment	
Utilities	35 Electricity, gas, steam and air conditioning supply	Utilities
	36 Water collection, treatment and supply	
	37 Sewerage	
	38 Waste collection, treatment and disposal activities; materials recovery	
	39 Remediation activities and other waste management services. This division includes the provision of remediation services, i.e. the cleanup of contaminated buildings and sites, soil, surface or ground water.	
Construction of Buildings	41 Construction of buildings	Construction
Civil Engineering	42 Civil engineering	
Specialised Construction Activities	43 Specialised construction activities	
Wholesale	45 Wholesale and retail trade and repair of motor vehicles and motorcycles	Wholesale & Retail
	46 Wholesale trade, except of motor vehicles and motorcycles	
Retail	47 Retail trade, except of motor vehicles and motorcycles	
Land Transport, Storage & Post	49 Land transport and transport via pipelines	Transport & Storage
	52 Warehousing and support activities for transportation	
	53 Postal and courier activities	
Air & Water Transport	50 Water transport	
	51 Air transport	
Accommodation & Food Services	55 Accommodation	Accommodation, Food Services & Recreation
	56 Food and beverage service activities	
Recreation	90 Creative, arts and entertainment activities	
	91 Libraries, archives, museums and other cultural activities	
	92 Gambling and betting activities	
	93 Sports activities and amusement and	

	recreation activities	
Media Activities	58 Publishing activities	
	59 Motion picture, video and television programme production, sound recording and music publishing activities	
	60 Programming and broadcasting activities	
Telecoms	61 Telecommunications	
Computing & Information Services	62 Computer programming, consultancy and related activities	Information & communication
	63 Information service activities	
Finance	64 Financial service activities, except insurance and pension funding	Finance & Insurance
	66 Activities auxiliary to financial services and insurance activities	
Insurance & Pensions	65 Insurance, reinsurance and pension funding, except compulsory social security	
Real Estate	68 Real estate activities	Professional & Other Private Services
Professional Services	69 Legal and accounting activities	
	70 Activities of head offices; management consultancy activities	
	71 Architectural and engineering activities; technical testing and analysis	
	72 Scientific research and development	
	73 Advertising and market research	
	74 Other professional, scientific and technical activities	
	75 Veterinary activities	
Administrative & Supportive Service Activities	77 Rental and leasing activities	
	78 Employment activities	
	79 Travel agency, tour operator and other reservation service and related activities	
	80 Security and investigation activities	
	81 Services to buildings and landscape activities	
	82 Office administrative, office support and other business support activities	
Other Private Services	94 Activities of membership organisations	
	95 Repair of computers and personal and household goods	
	96 Other personal service activities	
	97 Activities of households as employers of domestic personnel	
	98 Undifferentiated goods- and services-producing activities of private households for	

own use		
Public Administration & Defence	84 Public administration and defence; compulsory social security	Public Services
	99 Activities of extraterritorial organisations and bodies	
Education	85 Education	
Health	86 Human health activities	
Residential Care & Social Work	87 Residential care activities	
	88 Social work activities without accommodation	

## Appendix C...FAQ's

- Why does Experian's history for variable *x* differ from *another source / raw survey data*?
  - There are several possible reasons.
  - The first is a vintage mismatch. The ONS frequently revises its economic data in order to take account of new information or improved methodology. The date at which Experian has taken data for the current RPS is given in the body of this guide. Another source may have used earlier or later data.
  - The second relates to data processing. As explained in the body of this guide, it is sometimes necessary at the regional level and (particularly) at the local level to process or construct data. Our approach to doing this is explained in the body of this guide. We apply consistent methodologies to process the data. Other sources may carry this out in different ways. When compared against the raw source, our data may differ because, for example:
    - It has been constrained to other sources.
    - It has been converted into CVM data or quarterly data.
    - It has been made consistent with other data or a later vintage of data.
  - The third relates to raw survey data. Raw survey data is often volatile and does not take into account information outside the survey. Official statistics and our data are constructed from the raw survey data to take into account volatility, sampling issues and all available data sources.
- Why does Experian's job history differ from the *ABI* or *BRES*?
  - The ABI/BRES are surveys taken from a particular year; they are not updated.
  - ABI/BRES is a source for ONS' workforce jobs but it is not the only source.
  - Experian's workforce job history is designed to be consistent with the latest available ONS workforce jobs estimates (which may represent additional data or improved methodology.)
  - Raw survey is often incomplete and suffers from sampling variability, which does not represent true volatility in the underlying population data. This must be removed to ensure high quality data.
- How often are data updated?
  - We always use the latest available data at the cut-off date for history.
  - New GVA data is available from the ONS
    - At the UK Level, three times a quarter.
    - At the Regional and Local level, annually (normally in December.)
  - New Expenditure data is available from the ONS at the UK level twice a quarter.
  - New LFS Employment data is available from the ONS once a quarter.
  - New Workforce Jobs data is available from the ONS once a quarter.
  - New BRES is published once a year (normally in December.)
  - New Income data is available from the ONS
    - At the UK level, once a quarter.
    - At the Regional and Local level, once a year (normally in April.)
  - Population projections are published once every two years.
  - New mid-year population estimates are published annually.
  - New LCFS is published annually.
- How do revisions to historical data affect your history and forecasts?
  - As explained above, we always take into account the latest historical data.
  - The monthly UK macro forecast is updated after each ONS revision of GDP for a quarter.
  - The RPS is based on a particular UK macro forecast and includes the latest available regional and local data.
  - Forecasts are updated to be consistent with the latest historical data. While this will typically only affect the short-to-medium term, there are times when the long-run is necessarily affected. This will usually be when there has been a substantial revision to history.
- How are past growth trends captured in the forecasts?
  - All our models are econometric models.
  - An econometric model is a model estimated on historical data.

- The coefficients (i.e. interactions) in the model embed historical relationships between variables and historical growth rates in a variable.
- Where we believe that the forecast relationships may differ from history, we make appropriate adjustments to the forecast. This may be the case, for example, where an area has been substantially redeveloped in recent years.
- How are industry/regional/local developments and policies reflected in forecasts?
  - If these developments and policies are reflected in model inputs (for example population) or in history then they will be automatically captured by the model.
  - In any other case, we are able to make appropriate adjustments to take these into account.
  - At the industry level, we taken into account announced developments in that industry which are large enough to affect the growth in the industry at the national, regional or local level (as the case may be).
  - At the regional and local, we taken into account announced developments or policies which are large enough to affect growth at the regional or local level. The local model, in particular, has the facility to take into account the impact of additional population or jobs in a particular area.
  - It is important to realise that many developments or policies may not be sufficiently large enough to affect growth rates or may be implicitly included in the forecast from a higher level of aggregation.
- How does population relate to the employment forecasts?
  - This is discussed in detail in the methodology section above for the regions and the locals.
  - It is important to remember that employment is forecast on both a residence and workplace basis.
  - Residence based employment depends on local population (labour supply) growth but also on demand for work throughout the region and across the regional boundary.
  - Workplace based employment depends on labour supply throughout the region and across the regional boundary.
- What is working age?
  - The definition of working age used based on the state pension age.
  - As the state pension age for men and women changes in line with announced policy, the working age population will change to take this into account.
  - The key changes to the state pension age that have been announced are:
    - A gradual equality in state pension age for men and women.
    - A gradual rise in state pension age for both men and women to 67 (and 68 after the forecast horizon.)
- What is the participation rate / economic activity rate?
  - The participation rate or economic activity rate is the proportion of the working age population who are either employed or seeking employment (i.e. unemployed.)
  - The participation rate is an endogenous variable in all our models. It is not a fixed assumption.
- What assumptions have been made regarding commuting in the local model?
  - Commuting in the local model is based on estimates given by the ONS.
  - These are based on the Annual Population Survey.
  - Commuting assumptions are fixed over the forecast.
  - However, the outcome for commuting may differ from the assumption because (for example) there is insufficient demand or supply for labour to provide as many workers across a particular commuting relationship.
- How is Full-Time Equivalent employment derived?
  - This is based on the total hours worked (please see the glossary.)
  - The relationship between FTEs and hours is fixed by definition.
  - In different industries, the hours worked per job will differ.
  - Historical data for this is taken from ASHE (please see the body of the guide.)
  - The forecast takes into account changing trends in hours per job. This will necessarily alter the relationship between Full-Time Equivalent employment and jobs.
- How does the weighting of different factors change over the forecast period?
  - There is no fixed rule about the changes in this time.
  - The coefficients of the econometric equations are fixed over time
  - However, at the local level population growth becomes more important as unemployment decreases.

# Appendix D...About us



## Our economic forecasting expertise

Experian's team of 18 economists is a leading provider of global, national, regional and local economic forecasts and analysis to the commercial and public sectors. Our foresight helps organisations predict the future of their markets, identify new business opportunities, quantify risk and make informed decisions.

Experian's economics team is part of a 140-strong analytics division, which provides an understanding of consumers, markets and economies in the UK and around the world, past, present and future. As part of the Experian group, the analytics division has access to a wealth of research data and innovative software solutions. Its statisticians, econometricians, sociologists, geographers, market researchers and economists carry out extensive research into the underlying drivers of social, economic and market change.

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## Appendix B Cambridge Method

This appendix includes a summary of the method provided to Nexus by Cambridge. It confirms that the population input is SNPP 2012 (as with Experian).

The appendix also includes a further note written by Cambridge to inform the recent Oxfordshire SHMA (which Cambridge Co-authored). This confirms that, as with Experian, the baseline population is fixed at SNPP 2012 and does not flex. So the baseline 13,000 new jobs assumes no more houses in the area than 554dpa.

# 1 Introduction

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In September 2013 Cambridge Econometrics and SQW were commissioned by Vale of White Horse District Council and partners (Oxfordshire Local Enterprise Partnership, Oxford City Council, Oxfordshire County Council, Cherwell District Council, South Oxfordshire District Council, West Oxfordshire District Council) to prepare a set of economic forecasts for Oxfordshire, to be used in the county's Strategic Housing Market Assessment (SHMA) and the Local Enterprise Partnership's (LEP) Strategic Economic Plan (SEP).

A Planned Economic Growth forecast was developed for the study, using Cambridge Econometrics' Local Economy Forecasting Model (LEFM), in three stages:

- **Baseline** projections, effectively assuming that historical trends in relative growth in Oxfordshire compared with the wider South East (or UK) economy (on an industry-by-industry basis) seen over the past 15 years or so continue into the future. The projections are consistent with CE's baseline economic forecasts for the nations and regions of the UK. Growth in some sectors (public administration, education, health, residential & social care, and retailing) is also influenced by population growth. The input assumptions for population growth in Oxfordshire in the Baseline projections are the ONS 2011-based interim subnational population projections (SNPP).
- **Alternative Population-based** projections, in which the input population projections for Oxfordshire are replaced with an alternative set that correct particular anomalies (relating to the student population) in the ONS projections.
- a **Planned Economic Growth** forecast which reflects policy influences on economic growth such as proposals relating to the Science Vale Enterprise Zone, Oxfordshire City Deal, NW Bicester Eco Town and other planned infrastructure investment

This report describes the methodology and development of the assumptions and forecasts, provides a description and comparison of the results, and draws out the policy implications for Oxfordshire and its districts.

Chapter 2 describes the methodology and results for the Baseline projections. Chapter 3 provides the same information for the Alternative Population-based projections. Chapter 4 provides a narrative and sets out the assumptions for the direct 'above trend' impact on employment for the Planned Economic Growth forecasts, and the results (including indirect and induced jobs) are described in Chapter 5. Finally, Chapter 6 considers the risks that need to be considered in delivering this scale of jobs growth, and how they should be factored into the overall forecasting work.



## 2 Baseline Projections

### 2.1 Introduction

This chapter presents the Baseline projections developed for each of the local authorities and Oxfordshire as a whole. Section 2.2 discusses the modelling framework and key assumptions underlying the Baseline projections, while the remaining sections describe the projections themselves.

### 2.2 LEFM and the Baseline projections

#### The Baseline projections were developed in LEFM

The Baseline employment projections presented in this chapter are developed using Cambridge Econometrics' Local Economy Forecasting Model (LEFM) tailored to the economy of Oxfordshire and its component districts (Cherwell, Oxford, South Oxfordshire, Vale of White Horse, West Oxfordshire).

LEFM is a demand-led model that models the relationships between firms, households, government and the rest of the world in a highly disaggregated framework (eg 45 industries), which enables the impact on the economy (employment and value added) of demand-side factors (such as an increase in demand due to stronger world growth) to be analysed. The disaggregated nature of the model is important because it allows the model to distinguish the very different relationships that exist between particular industries. For example, electronics is distinguished from other, more basic, manufacturing sectors that operate in completely different markets.

#### Only demand-side impacts are modelled

In LEFM, the impact on a local economy of faster population growth, say, is shown through the increased demand for goods or services in industries that are particularly dependent on population growth (eg retailing, public administration, health, education, leisure services, construction), which would feed through into higher output and employment (and into household incomes and spending) in those sectors.

The demand-side impact of a faster-growing population will not typically impact on firms in the electronics sector in the local area, say, as demand for goods from this sector will come almost entirely from the rest of the UK or world. The impact of supply-side factors, such as an increasingly-skilled workforce in the area attracting firms in particular sectors, is, as in other similar models, not modelled in LEFM.

#### Population is an input to LEFM...

In common with most sub-national economic models, population in LEFM is one of a number of inputs to the model – that is, population in LEFM is taken as given and does not change if economic growth in the local area changes.

#### ...and the Baseline uses the ONS 2011-based interim SNPP

The population projections used for the Baseline projections are based on the ONS' 2011-based interim Sub-National Population Projections (SNPP) made consistent with the latest mid-year estimates (to 2011). As they are interim projections, the 2011-based SNPP only provide projections to 2021. For 2022 onwards the projected trends in the 2010-based SNPP are assumed to continue and so growth rates from the 2010-based SNPP have been applied.

**The Baseline projections assume the continuation of past relationships**

The Baseline projections are based on the assumption that historical relationships between growth in the local area relative to the South East or UK (depending on which area that industry has the strongest relationship with), on an industry-by-industry basis, continue into the future. Thus, if growth in an industry in the local area outperformed the same industry in the region (or UK) as a whole in the past, then it will be assumed to do so in the forecast period. Similarly, if it underperformed the South East (or UK) in the past then it will be assumed to underperform the region (or UK) in the future.

**The projections are consistent with CE's regional forecast, from May 2013**

The projections are consistent with CE's forecast for the regions and nations of the UK, as developed using the Multi-Sectoral Dynamic Model (MDM-E3) of the UK economy and published in May 2013.

The results for Oxfordshire and its districts are projections rather than forecasts. They represent the results of model-based analysis, but have not been refined in the light of qualitative information, legislative changes or other 'soft' information.

**Adjustments were made to the Baseline projections for education**

After reviewing the initial model-based Baseline projections, and following discussion with Oxfordshire County Council and the local authorities, the pure model-based projections for the education sector in Oxfordshire *have* been adjusted. This is because the education sector in Oxfordshire is thought to have particular characteristics that mean that benchmarking all its growth against the South East or UK is not appropriate going forward.

For example, prospects for growth in the education sector in Oxfordshire (particularly Oxford), is dependent to a large degree on demand for university-based research and demand from students throughout the UK and rest of the world (for university places), rather than demand from the school-age population in the county catchment area. With this in mind, the model-based Baseline projection for employment, which takes account of relative population growth in the county (and cuts in government education budgets at the UK level), was thought to be too low, and so adjustments were made to reflect the expectation that the education sector in Oxfordshire will suffer less of a downturn in employment growth in the short and medium term than the model-based projections would suggest.

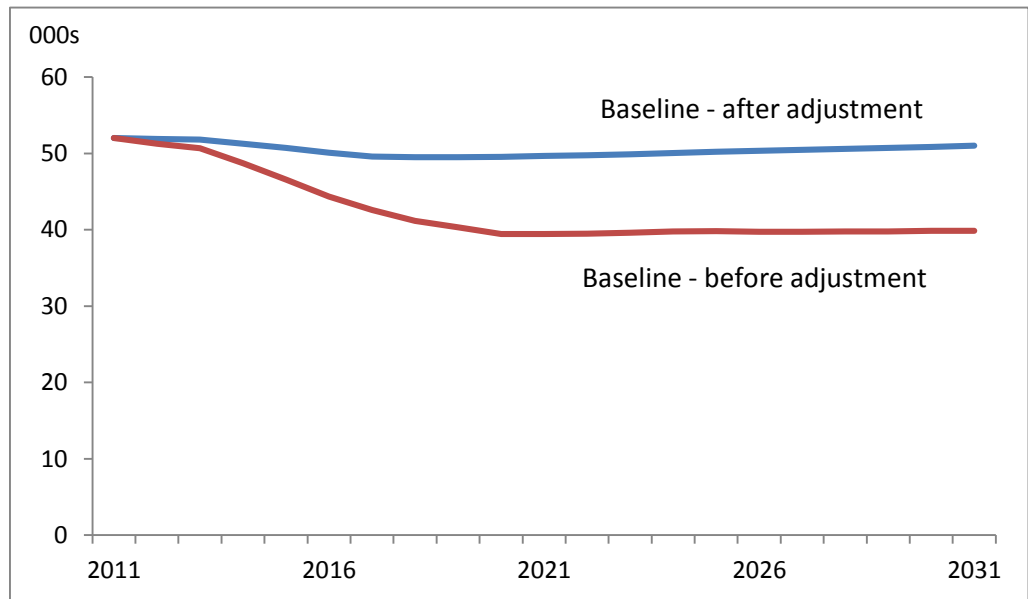
According to the ONS' Business Register and Employment Survey (BRES), almost half of all employment in education in Oxfordshire is in higher education, compared with only around one-fifth in the South East as a whole. The adjustment made is to assume that the half of employment in higher education in Oxfordshire remains constant over the forecast period (rather than falling, in the short term, in line with CE's assumptions for education as a whole). The other half (pre-school, primary, secondary and 'other') is assumed to move in line with CE's general assumptions for education, reflecting government spending cuts, as in the model-based Baseline projection. The adjustment is made to better reflect the particular drivers behind the education sector in Oxfordshire compared with the standard method for developing baseline projections in LEFM for other areas. The adjusted projection should still be seen as a 'business-as-usual' projection (ie what would happen if past relative

trends continued into the future) rather than any sort of policy adjusted forecast (as described in Chapters 4 and 5).

The result of the adjustment is presented in Figure 2.1, which shows that in the adjusted Baseline projection employment in education in Oxfordshire is around 11,000 higher than in the purely model-based (ie unadjusted) Baseline, in 2031.

The adjustments to the Baseline employment projection for education, by district, are shown in Table 2.1. The adjustment to the projection for employment in education in Oxfordshire as a whole was allocated to the districts based on the relative size of the education sector in each district. Thus, the impact of the adjustment is largest (7,800 in 2031) for Oxford city.

**Figure 2.1: Baseline projection of employment in education, before and after adjustment**



**Table 2.1: Impact of adjustments to Baseline projection of employment in education**

	2011 (000s)	2021 (000s)	2031 (000s)
Oxfordshire	0.0	10.2	11.1
Cherwell	0.0	0.9	0.9
Oxford	0.0	7.1	7.8
South Oxfordshire	0.0	0.7	0.8
Vale of White Horse	0.0	0.8	0.9
West Oxfordshire	0.0	0.7	0.7

Notes: Figures are rounded to the nearest 100 jobs.  
Source: Cambridge Econometrics, January 2014.

**The projections are neutral to new policy at local level**

Except insofar as particular policies were in force during the period over which the historical relationships have been estimated (around 15 years), and insofar as new policies are taken into account in CE’s forecasts at a national and regional level (which drive the local area projections), the Baseline projections by local authority are policy neutral. For example, they would not take into account a new policy that favours a particular sector in the local area, or a decision to release land for economic development at a different rate than in the

past. As mentioned above, the UK regional forecasts underlying the Baseline projections were published by Cambridge Econometrics in May 2013. They take into account analysis of government spending plans as published in HM Treasury's Public Expenditure Statistical Analysis in July 2012 and Autumn Statement in December 2012.

**There are no constraints on labour supply**

In the forecasts developed for this study, it is assumed that employment growth is not restricted by labour market constraints, except insofar as such constraints have existed in the recent past (which would be reflected in the historical relationships that are estimated). If, in the forecast period, the labour supply in the local area is not sufficient to satisfy the level of employment projected, then the shortfall is assumed to be made up by increased net in-commuting.

**Employment in LEFM is measured as 'jobs'**

The measure of employment in LEFM and throughout this report is *jobs*, some of which are part time; the metric is not full time equivalent jobs. This means that the actual number of *people* employed in each area can be less than this figure, if, for example, someone has more than one part-time job. Estimates from the Annual Population Survey suggest that less than 4% of workers hold more than one job. The measure includes self-employment, whether on a full-time or part-time basis.

### 2.3 Headline findings for the Baseline projections

As discussed above, the Baseline projections are model-based projections in which historical relationships between growth in Oxfordshire and growth in the South East or UK, on an industry-by-industry basis, are expected to continue into the future. Rather than being a forecast of what we expect to happen in the future, it is a projection of what the Oxfordshire economy could look like if past trends (in terms of relative growth relationships, rather than trends in growth per se) were to continue into the future, with no change in policy. It should therefore be seen as a starting point, from which to build the further stages in which alternative population projections and changes in policy (be that government policy or changing business investment patterns, say) are taken into account. The further stages are described in subsequent chapters.

**Overall growth in employment in for Oxfordshire**

Figure 2.2 shows the Baseline projection for total employment in Oxfordshire, compared with CE's forecast for the South East. The data are indexed to 2011=100, so that they can be presented and compared in the same chart. The chart shows that employment in Oxfordshire is projected to grow at a slightly slower rate than the South East average in the medium term, and then at about the same rate in the longer term.

Table 2.3 shows levels, changes in levels, and growth rates, for employment in Oxfordshire, the districts and the South East and UK. It shows that over 2011-31 (2011 is the last year for which official ONS employment data were available for Oxfordshire and the districts at the time the forecast was developed) employment in Oxfordshire is projected to increase by 36,400 (approximately 1,800 jobs per annum, or 0.4-0.5% pa). This is, on average, considerably slower than seen over 2001-11 (about 2,900 jobs pa, or 0.8% pa). This result reflects the industry mix in Oxfordshire and CE's UK Regional forecast for prospects in particular sectors (especially education, health and residential & social care).



# Appendix C    Oxford Model

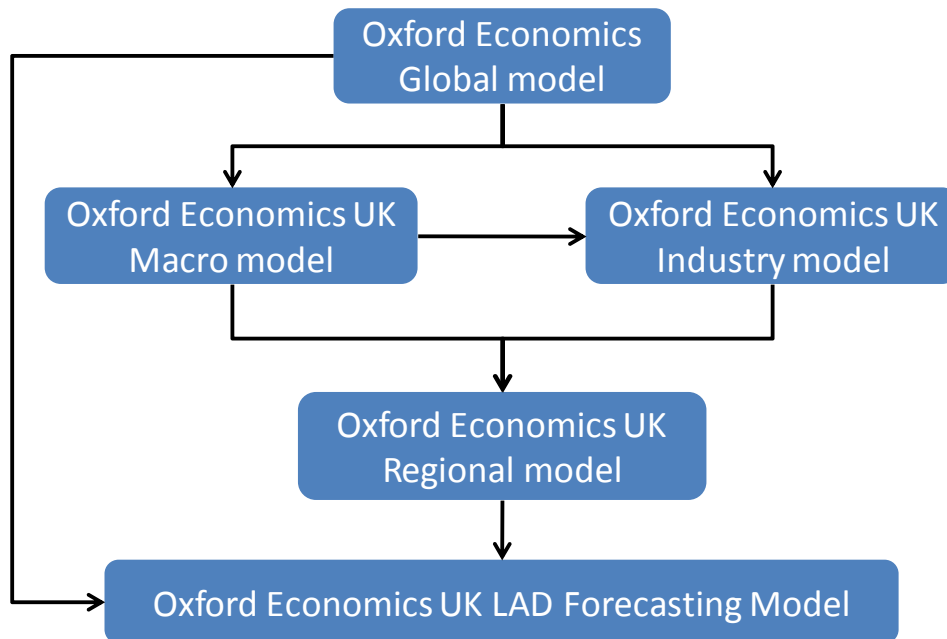
PBA's note on the Oxford model. Previously supplied to PBA by Oxford Economics in February 2014.



## Local Authority District Forecasting Model

Oxford Economics Local Authority District Forecasting Model sits within the Oxford suite of forecasting models. This structure ensures that global and national factors (such as developments in the Eurozone and UK Government fiscal policy) have an appropriate impact on the forecasts at a local authority level. This empirical framework (or set of 'controls') is critical in ensuring that the forecasts are much more than just an extrapolation of historical trends. Rather, the trends in our global, national and sectoral forecasts have an impact on the local area forecasts. In the current economic climate this means most, if not all, local areas will face challenges in the short-term, irrespective of how they have performed over the past 15 years.

**Figure 1.1: Hierarchical structure of Oxford Economics' suite of models**

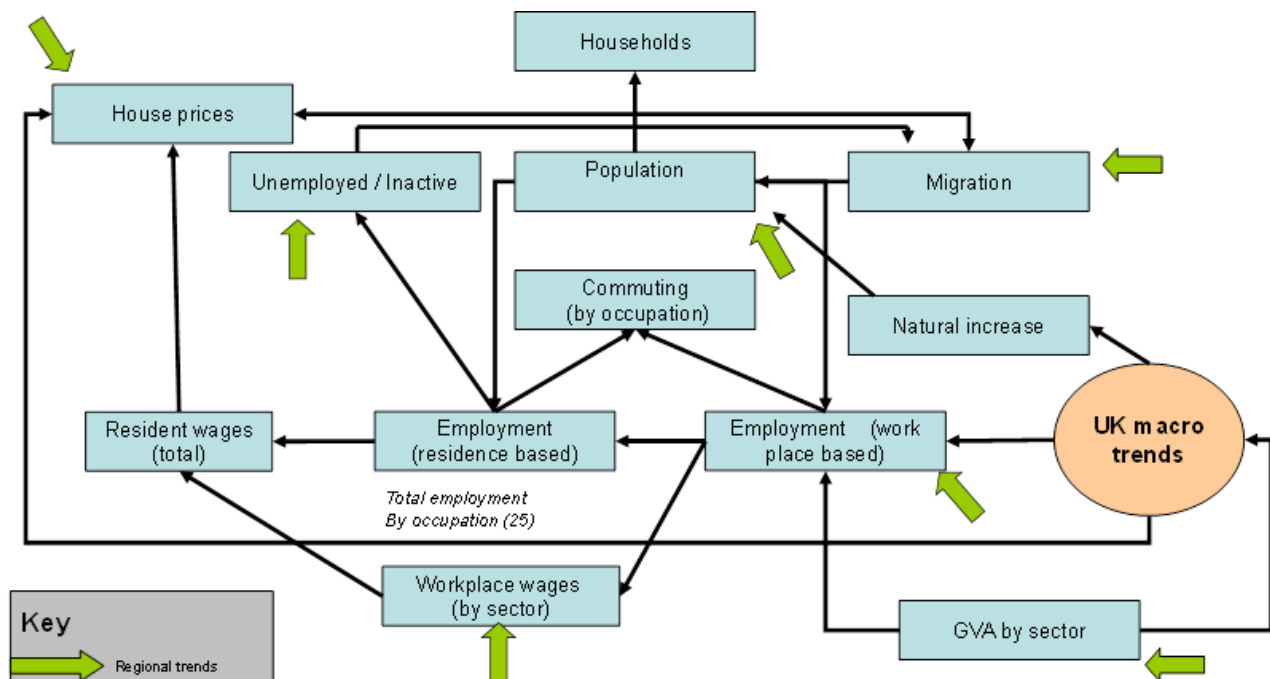


Our local forecasting model depends essentially upon three factors:

- National/regional outlooks – all the forecasting models we operate are fully consistent with the broader global and national forecasts which are updated on a monthly basis.
- Historical trends in an area (which implicitly factor in supply side factors impinging on demand), augmented where appropriate by local knowledge and understanding of patterns of economic development built up over decades of expertise, and
- Fundamental economic relationships which interlink the various elements of the outlook.

The main internal relationships between variables are summarised in Figure 1.2. Each variable is related to others within the models. Key variables are also related to variables in the other Oxford Economics models.

**Figure 1.2: Main Relationships**



The forecasts are produced within a fully-integrated system, which makes assumptions about migration, commuting and activity rates when producing employment and population forecasts.

Our local authority area forecasts are predominately ‘economics led’ in so much that our view of employment growth shapes population through the mechanism of migration. The rationale being that migratory labour tends to be attracted to locations which provide the best perceived job opportunities. Our methodology also takes account of the fact that jobs in local area will also be filled by existing non-employed local residents and commuters, as well as migrants.

An example is the best way to illustrate this. Let us assume a town generates 1000 new jobs over the next decade. Our method will allocate these new jobs partly to existing local residents who are not economically active (i.e. the unemployed or inactive), in-commuters or new migrants. The balance between these three groups depends on existing economic/employment rates of non-employed existing residents (so if everyone already has a job then the new jobs must be filled by commuters or migrants) and existing commuting patterns (low paid jobs are less likely to be filled by commuters than high paid jobs), and finally the balance from migrants.

The population and employment forecasts are inter-linked, thus if more people are attracted into an area this will have implications for the employment forecasts via demand for local services (education, healthcare, retailing, leisure etc.). It is a little more complicated than this as developments in one local area affects another, so the models have to solve simultaneously.

Therefore forecasts from other sources, including alternative population forecasts, should not be set aside those produced by Oxford Economics' Local Authority District Forecasting Model as they will not be consistent given linkages within the Oxford model.



## Appendix D Note on Economic Activity Rate changes and alternative modelling approaches

### Introduction

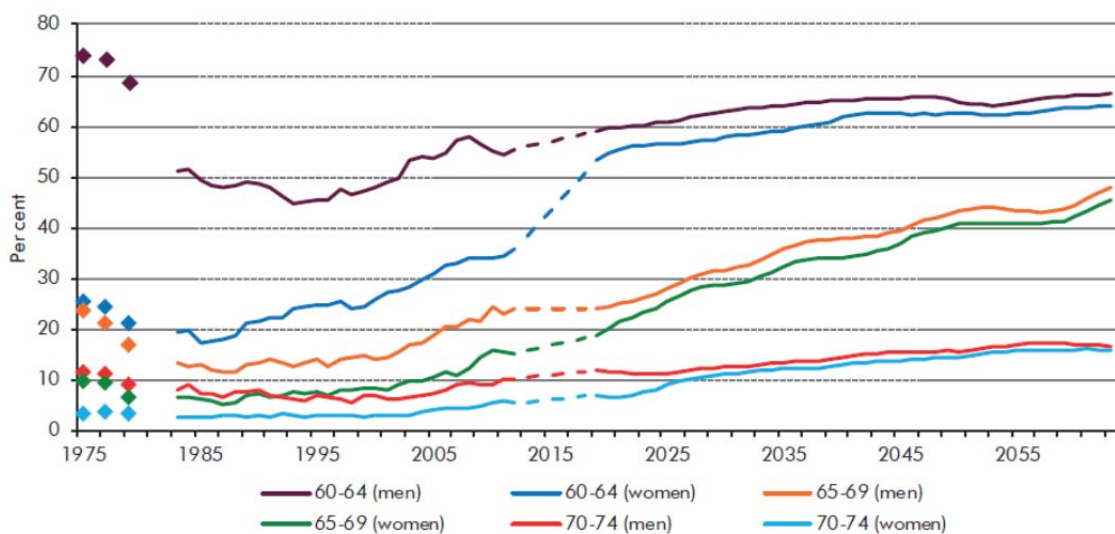
1. All three economic models now in front of the Examination in Public generate a similar number of new jobs in the local economy. But there is disagreement about the level of new homes needed to support these jobs, with objectors suggesting many more new homes are needed than either PBA or Experian.
2. Through testing we have established that the assumptions made in the objectors' demographic models differ substantially from those made in the original economic model. In this note we explain how, by keeping key variables fixed in the demographic models (whereas the economic model used to generate the job number varies them), the objectors will be exaggerating the 'need' for new homes.
3. We focus on perhaps the main and most obviously contradictory modelling choice made by Pegasus and also Nexus; that is to keep Economic Activity Rates fixed in their demographic work. Because economic activity rates are only one variable of fully integrated economic models they cannot be examined in isolation. So we also discuss other variables including commuting and unemployment later in this note.
4. As covered in our hearing statements, PBA maintain that keeping Economic Activity rates constant is not a robust approach; nor is assuming that all jobs are full time and require inward migrated labour. These assumptions, made outside the economic models, are likely to be a main reason why some of the objectors' housing numbers are so much higher than those calculated by PBA, given similar job expectations.

### Why are Economic Activity Rates so important?

5. The population profile of the HMA is comparably elderly. Older people, at or above state pension ages, comprise a larger proportion of the population than many other places. Because of the population profile, the HMA is more sensitive to assumptions about older age economic activity rates and part time working (older people have a greater propensity to work part time) than many other places.
6. Regarding economic activity rates in older people, there is already a long term trend for older people to work longer, up to and past state retirement ages. This partly reflects extended life expectancy and improved health of older people who no longer need (or want) to retire in their early 60's.
7. In addition to this long term trend, the Government has committed to increasing the age at which State Pensions are available. Some of these legal changes will take effect in the plan period.
8. Unfortunately the ONS has not updated their economic activity rate projections to reflect these legal changes. For this reason, PBA has used the Kent County Council research to extend the former ONS projections when testing the demographic scenarios. More recent than this Kent data, in summer 2014 the Office of Budgetary Responsibility (OBR) considered older age participation rates in the workplace when preparing their annual report to Government. The OBR is the Government's independent economic advisors who draw on their own expertise but also the combined knowledge of all the economic forecasting houses, including Experian, Cambridge and Oxford Econometrics.

9. The OBR have confirmed the long term trend for increased economic participation, as already well established by the ONS. They also make a new adjustment for increased pension ages, reflecting Government policy.
10. The chart below is taken from the OBR summer 2014 report.<sup>5</sup> Employment rates (related to EA Rates – the report discusses both) increase from 33% in 60-64 year old women (2011) to 55% in only 5 years as the state pension age changes take effect. They then revert to a much more modest rate of increase<sup>6</sup>.
11. However, the change does not only affect the 60-64 year old population. The OBR expects EA rates for 65-69 year olds to also increase as some older people continue to work past state pension ages (as they do at the moment). Employment rates for 65-69 year old women roughly double; from 15% in 2011 to around 30% in 2026.

Chart A.9: Employment rates for 60 to 74-year olds



12. In 2011 the HMA accommodated 6,835 women in the 60-64 age group and a further 6,045 women in the 65-69 age group. This shows that even small increases in EA rate assumptions for the 13,000 older age women have a significant effect on the size of the local workforce.
13. In the future these older women will be available to work and contribute to any job growth. In some of the objectors analysis, by keeping EA rates fixed, these same jobs require inward migrated labour (and consequently new homes).

### What was the Experian approach?

14. Economic Activity Rate are very important when estimating the future job potential of the local economy. But they are only one of the many variables considered in the integrated economic models such as Experian, Cambridge or Oxford Economics when estimating the 'headline' number of jobs.
15. These models do not consider any one variable in isolation but alongside many others, including commuting, unemployment, demand for jobs and services and the relative position of one local economy (one LPA) with its neighbours.

<sup>5</sup> <http://cdn.budgetresponsibility.org.uk/41298-OBR-accessible.pdf>

<sup>6</sup> Assuming 7,800 Women in this age group in 2025 and economic activity rates increasing from 34% to 58%. 1872 new economically active women.

16. With this in mind PBA worked collaboratively with Experian to comprehensively test the labour market through their full econometric model.
17. Four rounds of testing were undertaken. Two early rounds informed the published SHMA, These were undertaken using the Spring 2014 Experian Model which was the most upto data available at the time. Experian tested their baseline model, which used SNPP 2010 as their population input, and also a scenario where the higher (PBA 01-07 / 775dpa) population and migration replaced the SNPP 2010 used in the baseline.
18. From this initial testing Experian concluded that the local economy was not constrained by a lack of labour and providing higher, than baseline migration, would not translate directly into additional job growth.
19. In summer 2014 Experian updated their model, bringing in new Census data and population projections. This included updating the model with the new 2012 population projections and new census data. The two further, more detailed testing rounds used this new model run.
20. Using this updated model Experian reached an identical conclusion – that the local economy is not constrained by a lack of labour and so a higher migration flow does not directly translate into additional new jobs. Regardless of the higher population in the 775 dpa scenario the total number of jobs resulting from the model was similar.
21. The results of this testing have been made available in the EiP document library, and are set out in Additional Information from PBA Regarding Technical Assumptions/Data : Reference CD/SUS11. However, Experian state that these should be treated with caution as the data is the output of the fully integrated model where all these factors inter-relate; in addition to the wider region economy and labour market.
22. The detailed data shows that in both the baseline and scenario the jobs are resourced from the migrated labour from the 2012 Sub-National Population Projections (SNPP) but also other economic changes. The most noticeable of which is increased economic activity rates in older people coupled with increased part time working (and some 'double jobbing'). Other changes include reducing unemployment from the 2011 (recessionary) high back to long term averages, and some small commuting changes (although these are not significant)<sup>7</sup>.
23. The interaction of all these variables allows the 13,000 new jobs to be supported with fewer new homes than objectors suggest.
24. Working with Experian PBA considered testing higher job led scenarios but this was discounted by Experian. The main reason was that the sector structure of the HMA is not 'high growth'. Most noticeably one in three jobs in the HMA are 'Public Sector'; in Dorchester (the County Town) nearly 2 in every 3 jobs are in public services. In the past (under the Labour Government) these experienced strong growth. But the new Government is actively constraining the public sector.
25. Also the area is also reliant on a tourist economy. The number of jobs in these tourist related sectors are very weakly linked to the resident population.

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<sup>7</sup> The model also makes some small adjustments to commuting; commuting links in the model are complicated because flows also reflect the competing strengths of neighbouring economies. Commuters are attracted to stronger, growing economies. In this case Experian expect a small increase in outward commuting. But this is very small and well within a margin for error (3,000 net by 2031 or 3.5% of the labour force).

Regarding economic activity rates the Experian baseline projection shows that the overall activity rates are broadly stable over the projection period. This is despite age-specific rates for the older age groups increasing. This is because the population is ageing, so there are fewer younger people and more older people in the end projection years. The increasing age-specific rates for older age groups are only just enough to offset the impact of this ageing on the overall rate.

26. Consequently, artificially providing more new homes will not automatically trigger more new jobs. As an illustration of the reverse, Experian cite the Thames Valley, where past job growth was constrained by a lack of labour, and the economy structure is receptive to increased migration. In areas such as these providing more new homes would trigger job growth.
27. A similar conclusion may also be drawn from Cheshire East; where the Inspector has recently requested further work because in that geography there is evidence that the Councils proposed housing number is constraining the local economy. These circumstances do not apply in this HMA.

### **What is the Cambridge or Oxford approach?**

28. The lead economist at Experian is familiar with the main competing models and has previously worked at Cambridge, so is well placed to comment how different models may work.
29. Experian confirm that all models work in a similar way; all models flex similar variables when estimating how many jobs to project. It would not be robust or credible for any forecasting house to assume fixed Economic Activity rates or unemployment rates in their model as this does not reflect long term trends or Government legislation.
30. All the models also have a default, built in population input which is used as a 'starting point' in their models before seeking additional labour through inward migration (Oxford model only) or commuting and other labour market adjustments such as reducing unemployment (all models)
31. PBA has asked objectors to confirm how reliant their economic models are on increased migration, as opposed to the other demographic variables. However, they have been unable to secure this information as objectors suggest that the data is not available. PBA notes that such outputs are commercially available, although often at additional cost and outside standard products. Cambridge Econometrics offer a commercial service package to test key demographic assumptions in their model. This forms part of their Local Economic Forecasting Model (LEFM) . This product (LEFM)<sup>8</sup> is designed to allow planners to test key labour market variables including:

"Scenarios can be determined, driven by alternative assumptions for

- the UK economy alternative macro scenarios can be developed by CE in MDM)
- demand for individual industries (structural change)
- population (by age and gender)
- activity rates (by age and gender)
- labour market dynamics
- future change in structure of occupations"

### **Conclusions**

32. All the models available to the EiP use a default population assumption as an input. Cambridge have confirmed they use the same as Experian (i.e. SNPP 2012) and we would expect Oxford to be similar although Pegasus Planning (the only party using Oxford) are unable to confirm,
33. All three models produce a similar number of jobs in the economy.

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<sup>8</sup> [http://www.camecon.com/SubNational/SubNationalUK/ModellingCapability/LEFM/using\\_lefm.aspx](http://www.camecon.com/SubNational/SubNationalUK/ModellingCapability/LEFM/using_lefm.aspx)

34. However the objectors, by fixing key variables which flex in the economic models, make the potentially erroneous conclusion that providing for these jobs requires a significant uplift in migration (and so more houses).
35. PBA tested this assumption with Experian in detail. They have demonstrated that higher than SNPP migration is not needed to deliver the projected number of jobs. There is no evidence from either Cambridge or Oxford that their models require additional migration.
36. PBA don't have full access to the objector's models. However, we do know that Cambridge, which Pegasus and Nexus rely on, use the same default population assumptions as Experian (SNPP 2012) and produce a similar job number. It is therefore a reasonable conclusion that the Cambridge model has made similar allowances as Experian and is not entirely reliant on migrated labour.