OXFORD ECONOMICS

East of England Forecasting Model

Technical Report:

Model description and data sources

January 2015

OXFORD ECONOMICS

Contents

1: Introduction

The East of England Forecasting Model (EEFM) was developed by Oxford Economics to project economic, demographic and housing trends in a consistent fashion and in a way that would help in the development of both the Regional Economic Strategy and the Regional Spatial Strategy for the East of England. The Model is based in Excel spreadsheets, allowing users to produce scenarios under which the impacts of a given scenario can be monitored.

This report provides technical information on the EEFM's coverage, methodology and data sources. The latest forecast results are presented separately, on the Cambridgeshire Insight website.

The Model's outputs are just one piece of evidence to assist in making strategic decisions. As in all models, forecasts are subject to margins of error which increase at more detailed geographical levels. In addition, the EEFM relies heavily on published data, with BRES / ABI employment data in particular containing multiple errors at local sector level, though the Model does attempt to correct for these.

The development of a model, though a largely quantitative exercise, also requires past modelling experience and a degree of local knowledge if it is to produce plausible long-term projections. The EEFM and wider suite of Oxford models have been developed by a team of senior staff (Graham Gudgin, Kerry Houston and Mark Britton) who have a long history in model-building and forecasting at both local and regional level. The team has built up considerable knowledge of the East of England's local economies, but the feedback of local partners is essential. Discussions with local stakeholders and the EEFM Model Steering Group, and a BRES consultation exercise with local authority representatives, are key inputs to each run of the Model.

History of the EEFM

A number of EEFM baseline forecasts have been published to date, or are programmed for the future. The timings are:

- August 2007 - First EEFM release
- February 2008 - Second EEFM release
- November 2008 - Third EEFM release
- March 2009 – 'Spring 2009 release'
- October 2009 – 'Autumn 2009 release'
- March 2010 – ' Spring 2010 release'
- October 2010 – 'Autumn 2010 release'
- Spring 2012 – 'EEFM 2012 release'
- Summer 2013 – 'EEFM 2013 release'
- Autumn 2014 – 'EEFM 2014 release'

In addition, a number of alternative scenarios were generated using the Model to inform the development of the RES and RSS. The EEFM Model Steering Group has oversight of the scenario process. An advantage of the Model is that it is sufficiently flexible to generate a variety of scenarios. With each model update, these scenarios are produced by Oxford Economics. However, representatives at Cambridgeshire County Council have been trained to use the model to generate bespoke scenarios using the model which is delivered with each update.

Key outputs associated with the development of the EEFM and its forecasts so far include:

- East of England: Joint Modelling for the RES and RSS – August 2007
- East of England: Joint Modelling for the RES and RSS (update) – November 2008
- East of England Forecasting Model, Spring 2009 forecasts – May 2009
- East of England Forecasting Model, Autumn 2009 forecasts – November 2009
- East of England Forecasting Model, Spring 2010 forecasts – June 2010
- East of England Forecasting Model Technical Report (Spring 2010 update) – June 2010
- East of England Forecasting Model, Autumn 2010 forecasts – November 2010
- East of England Forecasting Model Technical Report (Autumn 2010 update) – December 2010
- East of England Forecasting Model, EEFM 2012 forecasts – June 2012
- East of England Forecasting Model Technical Report – June 2012
- East of England Forecasting Model, EEFM 2013 forecasts – July 2013
- East of England Forecasting Model Technical Report – August 2013
- East of England Forecasting Model, EEFM 2014 forecasts – November 2014
- East of England Forecasting Model Technical Report – January 2015

The outputs released are available on the Cambridgeshire Insight website. A number of other related resources can also be accessed on the site (see below).

Report structure

The purpose of this document is to provide a description of the Model's methodology and the data sources used, and act as a companion reference guide to the published results. It will be updated as the Model itself is developed, improved and updated. The report is structured as follows:

- **Chapter 2: Description of the Model** – This chapter summarises the EEFM coverage with respect to geography, time periods and linkages with other models produced by Oxford Economics.
- **Chapter 3: Model Overview** – This chapter summarises the structure of the EEFM, and the linkages and relationships between variables.
- **Chapter 4: Data Used** – This chapter lists the variables in the Model, and indicates the latest data used. It also explains any processing of the data carried out prior to its use in the EEFM.
- **Chapter 5**: **Outliers and Data Validity –** This chapter summarises Oxford Economics' approach to anomalous data (so-called "outliers") and the methods used to check that the EEFM is internally consistent.
- **Chapter 6**: **Performance Monitoring –** This chapter explores the accuracy of the Model over previous forecasting cycles. It will be updated with each run of the Model in order to monitor its performance.
- **Chapter 7**: **Employment Land Module** – This chapter outlines our methodology for calculating employment land use forecasts under the 2014 update of the East of England Forecasting Model (EEFM).

This report does not provide EEFM forecast results. These can be found on the Cambridgeshire Insight website www.cambridgeshireinsight.org.uk/EEFM. The detailed forecasts are available in Excel spreadsheets, accompanied by an Oxford Economics PowerPoint report which is also available from the Cambridgeshire Insight website.

2: Description of the Model

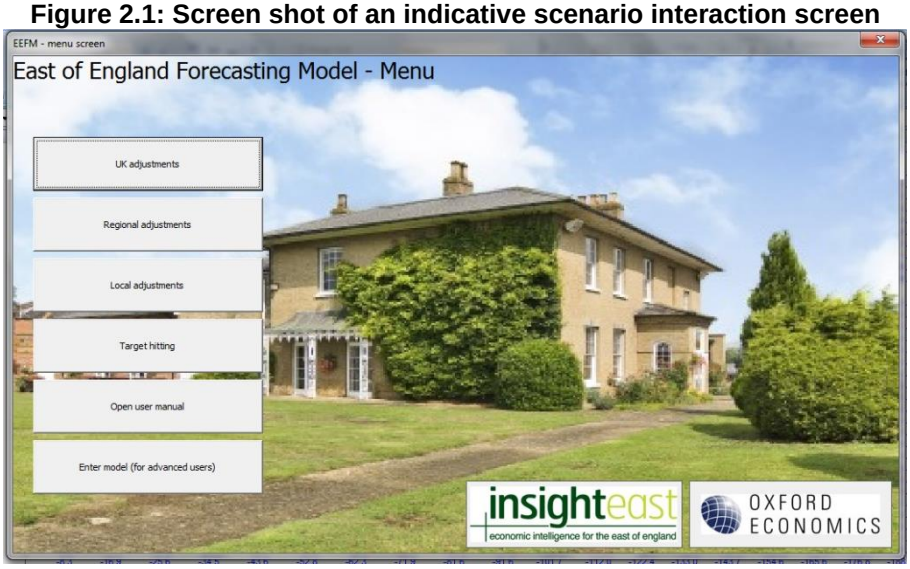
This chapter provides an overview of the East of England Forecasting Model (EEFM) and summarises its coverage and links to other Oxford Economics models. It also contains a list of the variables and geographies used. The forecasting methods and data sources are described in subsequent chapters.

Structure of the EEFM

The East of England Forecasting Model (previously the EEDA-EERA Forecasting Model) is a spreadsheet-based model originally designed to help inform and monitor the development and review of the RES and RSS. It covers a wide range of variables, and is designed to be flexible so that alternative scenarios can be run and the impacts of different assumptions can be measured.

In addition to the Excel spreadsheet version, Oxford Economics has designed a 'front-end' version of the Model (see figure 2.1 below) providing an easy way for users to input scenario assumptions for testing. The Model software processes these scenario assumptions and produces outputs in Excel. Unfortunately, this facility is not available through the Cambridgeshire Insight website, and anyone wanting to test their own scenarios should discuss with Cambridgeshire County Council first.

Figure 2.1: Screen shot of an indicative scenario interaction screen



Key features of the Model are:

- A full database including over 150 separate variables for each of the East of England's 48 pre-April 2009 local authorities, as well as for historic counties, strategic authorities, selected other local authority groupings, the East as a whole, 8 local authorities in the East Midlands and the region as a whole, 21 local authorities in the South East and the region itself, and the UK;

- EEFM software allowing users to produce scenarios tailored to their needs (not available over the web);

- A comprehensive set of tables, charts and PowerPoint slides allowing users to select and assemble data on the variables, localities, scenarios and results they want; and

- A spreadsheet system containing:
    - Linked worksheets, to facilitate faster updating;
    - Worksheets structured to generate forecasts and scenarios;
    - Worksheets designed to produce tables, charts and PowerPoint presentations.

The overall Model structure captures the interdependence of the economy, demographic change and housing at a local level, as well as reflecting the impact of broader economic trends on the East of England. The employment forecasts take account of the supply and demand for labour, the demographic forecasts reflect labour market trends as they are reflected in migration (and natural change indirectly), and the housing forecasts take account of both economic and demographic factors. This structure allows scenarios which test the impact of variables upon each other – for example, the impact of housing supply on economic variables.

Geography

The Model produces forecasts for each local authority district and unitary authority in the East of England, and selected local authorities in the East Midlands and South East region to allow for LEP aggregation. For the EEFM 2014 forecasts, that equates to 77 local authorities, including the former Mid Bedfordshire and South Bedfordshire districts which have been retained at the request of regional partners - the new Central Bedfordshire unitary authority is one of the strategic groupings for which forecasts are also provided.

Forecasts are also available for selected groupings of local authority districts and unitaries. These were decided in consultation with regional partners through the EEFM Model Steering Group, and also include the new Local Enterprise Partnerships (LEPs). For a full list of the groupings available, refer to the EEFM section of the Cambridgeshire Insight website.

In addition to these geographies, forecasts for the East of England, East Midlands and South East regions, and for the UK, are available.

Time periods

The EEFM is constructed on an annual basis. Historic data for most variables has been collected over 20 years to provide a basis for estimating the relationships between variables and for forecasting future trends. Forecasts are currently made up to 2031, reflecting the available global, national and regional forecasts. But the longer-term forecasts should be treated with some caution, as unforeseen - but inevitable - future change in the underlying drivers will affect forecast accuracy. Medium-term forecasts are actually more likely to be better approximations than shorter-term ones, as we can usually be more confident about medium-term trends than about short-term random fluctuations around the trend.

Things to Remember When Using the Model

EEFM forecasts are based on observed past trends only

Past trends reflect past infrastructure and policy environments. Even where major new investments or policy changes are known and have actually started, they can only affect EEFM forecasts to the extent that they are reflected in the currently available data. If they have not yet impacted on the available data, they will not be reflected in the forecasts.

There are two sets of exceptional circumstances in which the currently available data need to be supplemented by other information. The first is where there are concerns about data quality. This issue is explored in Chapter 5. The second is where the Model produces unrealistic forecasts - for example, continuing an employment decline in a particular sector in a particular area until it reaches zero or even negative values. Manual adjustments to the Model are necessary in these situations, and here professional judgement inevitably comes into play. This is discussed further below.

The forecasts are unconstrained

This means that the forecast numbers do not take into account any policy or other constraints that might prevent their actual realisation on the ground. Forecasts of the demand for dwellings, for example, are the outcome of projected changes in employment, population, etc. If in reality planning constraints were to prevent this demand being satisfied, the associated forecast levels of economic, labour market and demographic variables would be less likely to materialise.

The forecasts are subject to margins of error

As with all kinds of forecasting, there are margins of error associated with the results which tend to widen over time. Furthermore, the quality and reliability of data decreases at more detailed levels of geography. Under current data-quality conditions, models are most helpful for identifying trends, average growth rates and broad differentials between areas and sectors. Accordingly, users are encouraged to focus on the patterns over time, not figures for individual years.

Reality is more complex than any model

Several of the modelled relationships are complicated and their treatment in the EEFM is necessarily simplified, despite its large size. In particular, the demand for housing is complex and not all the factors may be fully captured. Questions such as whether migrants' apparent willingness to live at higher densities than the existing population is merely a temporary state which requires much more investigation.

Forecasting models will not all agree

The EEFM's baseline forecasts can be compared with other published forecasts, but close agreement should not be expected and sometimes there can be wide divergences. These can arise from even small differences in underlying assumptions and in the timing and definitions of the data used. But with an awareness of these factors, the EEFM forecasts provide a useful starting point for an understanding of regional and local economic trends in the East of England, particularly when the baseline is accompanied by alternative scenario forecasts with which it can be compared.

Coverage

Later chapters provide more detailed information on the data used in the EEFM and how the linkages in the Model are used for the forecasting and scenario work. But the list below gives an overview of the variables covered by the Model:

- **Demography**
  - Population
    - Total
    - Working age (this was changed in EEFM 2013 to be defined as all people aged 16-64, as working age population defined as all people aged 16-retirement age - the previous definition of working age in the EEFM - is no longer published by the ONS)
    - Young (defined as all persons aged 0-15)
    - Elderly (all people aged 65+)
  - Migration (Note: domestic and international migration are not differentiated in the EEFM at either the regional or the local level. However, the regional migration forecasts are scaled to those from Oxford Economics' Regional Model, which does identify international migration.)
  - Natural increase

- **Labour market**
  - Employee jobs by 31 sectors (workplace-based, SIC 2007 based)
    - Agriculture & fishing **(SIC 01-03)**
    - Mining & quarrying **(SIC 05-09)**
    - Food manufacturing **(SIC 10-12)**
    - General manufacturing **(SIC 13-18, 31-33)**
    - Chemicals excl. pharmaceuticals **(SIC 19-23, excluding 21)**
    - Pharmaceuticals **(SIC 21)**
    - Metals manufacturing **(SIC 24-25)**
    - Transport equipment, machinery & equipment, etc. **(SIC 28-30)**
    - Electronics **(SIC 26-27)**
    - Utilities **(SIC 35-37)**
    - Waste & remediation **(SIC 38-39)**
    - Construction **(SIC 41-43)**
    - Wholesale **(SIC 45-46)**
    - Retail **(SIC 47)**
    - Land transport **(SIC 49, 52-53)**
    - Water & air transport **(SIC 50-51)**
    - Hotels & restaurants **(SIC 55-56)**
    - Publishing & broadcasting **(SIC 58-60)**
    - Telecoms **(SIC 61)**
    - Computer related activities **(SIC 62-63)**
    - Finance **(SIC 64-66)**
    - Real estate **(SIC 68)**
    - Professional services excl. R&D activities **(SIC 69-75 excluding 72)**
    - Research & development **(SIC 72)**
    - Business services excl. employment activities **(SIC 77-82 excluding 78)**
    - Employment activities **(SIC 78)**
    - Public administration **(SIC 84)**
    - Education **(SIC 85)**
    - Health & care **(SIC 86-88)**

  - Arts & entertainment **(SIC 90-93)**
  - Other services **(SIC 94-99)**
- Employee jobs – full time and part time by 31 sectors (workplace-based)
- Self-employed jobs by the 31 sectors (workplace-based)
- Total employment (employee jobs plus self-employed jobs) by the 31 sectors (workplace-based)
- Total number of people employed in an area (consistent with 2001 and 2011 Census points)
- Total number of an area's residents who are employed (consistent with 2001 and 2011 Census points)
- Employment rate of an area's residents (aged 16-74, consistent with 2001 and 2011 Census points)
- Net commuting (number of people employed in an area, minus the number of that area's residents who are employed)
- Unemployed (claimant and ILO)

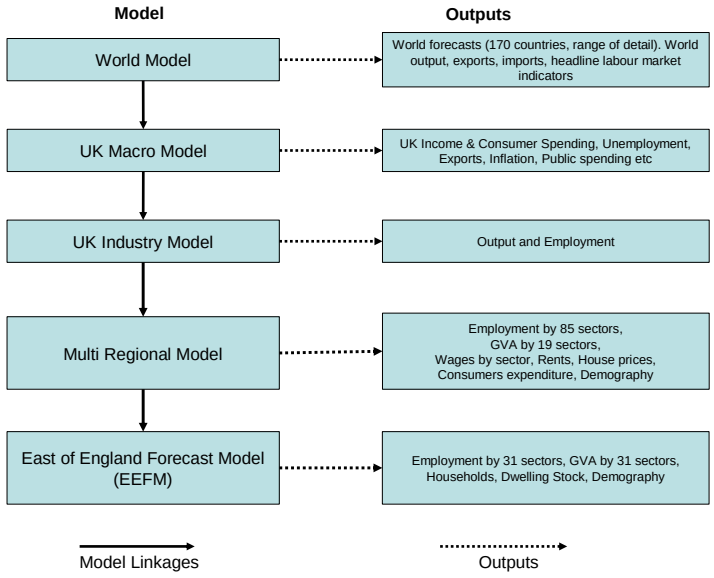
- **Output**
  - GVA (£m, workplace-based, 2003 prices for Spring 2009 forecasts, 2005 prices for Autumn 2009 and Spring 2010 forecasts, 2006 prices for Autumn 2010 forecasts, 2008 prices for EEFM 2012 forecasts, 2009 prices for EEFM 2013 forecasts, and 2010 prices for EEFM 2014 forecasts by 31 sectors listed above). Note that ownership of dwellings (imputed rents as defined in the Blue Book) is now included within real estate sector, previous published as its own sector.
  - Productivity by 31 sectors (per job, including both employee and self employed jobs)

- **Housing**
  - Households
  - Demand for dwellings

Links with other models

An important feature of the EEFM is its links to other Oxford Economics forecasting models, ensuring that all EEFM forecasts are consistent with Oxford Economics' world, UK national and UK regional forecasts. The links are summarised in Figure 2.2.

Figure 2.2: Links with the Oxford Economics suite of models



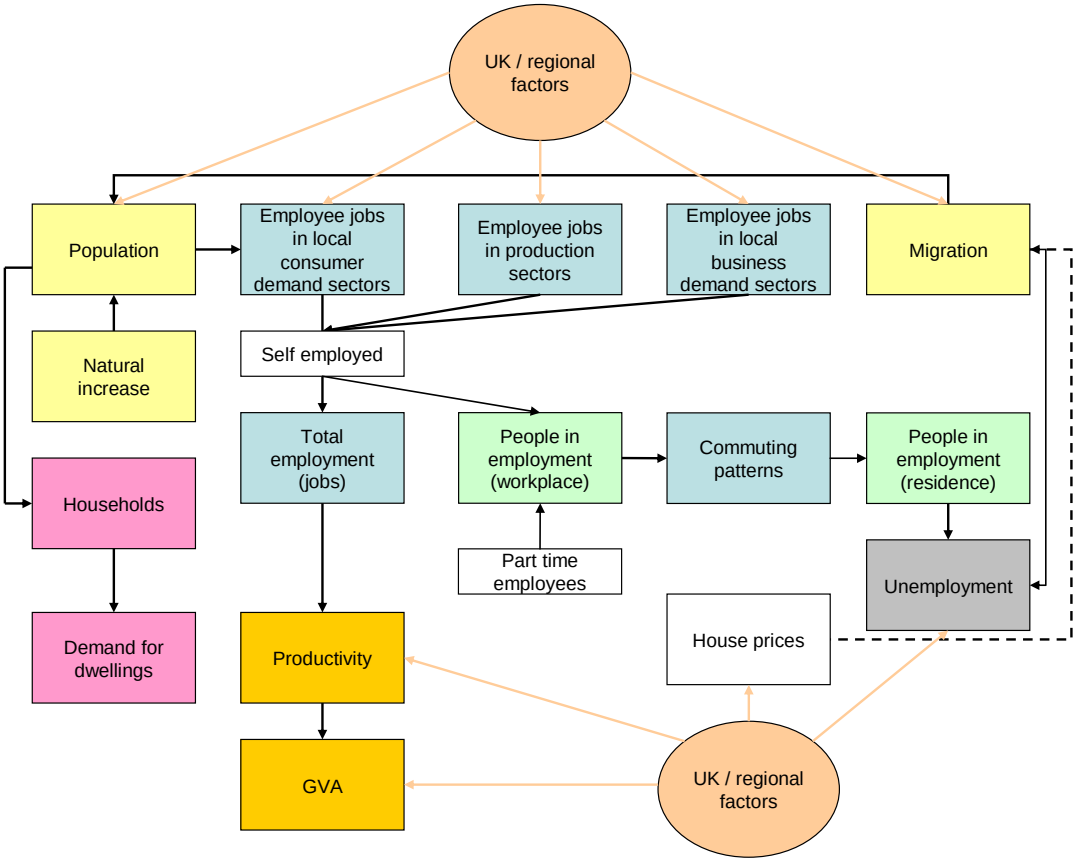
3: Model overview

The structure and data inputs of the Oxford Economics Regional Model, which underpins the EEFM, is not set out here, but can be obtained from Oxford Economics on request.

Variables in the EEFM

The EEFM is very large, with over 12,000 economic, demographic and housing indicators. Each of these variables is linked to others within the Model, and many key variables are also linked to others in the wider Oxford Economics suite of models. The main internal relationships between variables are summarised in Figure 3.1, and the forecasting methodology for each element in the Model is then summarised.

Figure 3.1: Main relationships between variables in the EEFM Model



Economic variables

Workplace employees (jobs)

The total number of employee jobs in an area, whether full- or part-time. These can be taken by residents or by commuters from outside. Note that this is a measure of jobs, not workers, so if one person has two part-time jobs, for example, they are counted twice.

This is forecast separately in every area for each of the 31 sectors listed on page 9. The forecasts begin with something called a "location quotient" (LQ). This is a ratio which summarises the concentration of a particular sector in a particular area, relative to the regional average. So an LQ of 0.8 (or 80%) for a given sector and area means that that sector is under-represented in the area. An LQ of 1.25 (or 125%) means that the sector is overrepresented in the area.

The EEFM contains location quotients for every local authority in the East region including the additional local authorities in the East Midlands and South East region required to construct LEP aggregates, for each of the 31 sectors, and for every year since 1991. Forecast trends in the LQs are based on how they have changed over time. So if the LQ for a given sector in a given area has been rising in recent years, the forecasts will project this to continue, and vice versa. LQs which have been stable for a long time (including at zero) will be forecast to remain so.

Three forms of location quotient are used in the EEFM. In the first, the LQ is based on *an area's share of the region's employees in a particular sector*. This is most appropriate for sectors which are essentially independent of the local economy (e.g., manufacturing). Their activities are largely driven by regional, national or international suppliers and customers, and the goods and services they produce are typically traded over long distances. The EEFM treats the following sectors in this way:

- Agriculture
- Mining & quarrying
- Food manufacturing
- General manufacturing
- Chemicals excluding pharmaceuticals
- Pharmaceuticals
- Metals manufacturing
- Transport equipment, machinery & equipment, etc.
- Electronics
- Utilities
- Waste & remediation
- Water & air transport
- Publishing & broadcasting
- Telecoms
- Computer related activity
- Research & development
- Other services

For this group, the local employee growth forecasts in the EEFM come from the interaction of the relevant LQ forecasts with the regional sector employee forecasts from Oxford's Regional Model. To take a hypothetical example, if the Regional Model forecasts a 5% increase in air transport employees in the East of England, this filters down to the local area forecasts in the EEFM. If the LQ for air transport in a given area is forecast to remain stable, the employee forecasts for air transport in that area will tend to show a 5%

increase. (In absolute terms, this means many new jobs in areas with high LQs and relatively few in areas with low LQs.) If the LQ is forecast to increase (or decrease) in an area, the local employee growth forecasts for air transport will tend to be more than (or less than) 5%.

The LQ in an area can also be based on the number of employees in a given sector *per head of the local population*, relative to the regional average. This is most appropriate for sectors in which employment change is primarily (but rarely exclusively) driven by changes in the local population (e.g., health and education). In the EEFM, this group includes:

- Wholesale
- Retailing
- Hotels & restaurants
- Public administration
- Education
- Heath & care
- Arts & entertainment

For this group, the local employee growth forecasts in the EEFM come from the interaction of the relevant LQ forecasts with the demographic forecasts for the area (which are also in the EEFM) and for the region as a whole (from the Regional Model). To take the example of education, consider an area which has an education LQ of 1.3 (or 130%) - perhaps because it has a university. Suppose that that LQ has been unchanged for a long time and is forecast to stay the same. And suppose that the area's population is also forecast to remain stable. But if the region's population is forecast to increase, education employees in this area will have to increase as well to keep the equation in balance (all other things being equal). This makes sense inasmuch as the area's education institutions clearly serve a market wider than the local area.

Finally, a sector's LQ can be based on the number of its employees *relative to all jobs in the area*, relative to the regional average. This is most appropriate for sectors where changes in employment arise primarily from changes in *total* employment locally - where the latter is effectively a proxy for business activity. (As might be expected, business services sectors tend to be in this group.) In the EEFM, the following are included:

- Construction
- Land transport
- Finance
- Real estate
- Professional services
- Business services
- Employment activities

In this group, the local employee growth forecasts in the EEFM come from the interaction of the relevant LQ forecasts with the regional sector employment forecasts from the Regional Model.

It is important to stress that the process of making these forecasts cannot be wholly automated. That is, some professional judgement is required to manually adjust the forecasts in cases where simply extrapolating the trend in location quotients from 1991 produces results which appear unrealistic for whatever reason. Altogether, around three-quarters of local sector LQ trends in the EEFM are subject to some kind of manual adjustment. The need for this is illustrated in Figures 3.2 and 3.3 below. Figure 3.2 shows two LQ trends for labour recruitment in Babergh - an automated extrapolation of past trends and a

manually-adjusted trend designed to offer a more plausible forecast in the light of recent data. It is this manually-adjusted trend which is imposed in the EEFM.

Figure 3.2: Employment location quotient for labour recruitment before and after manual adjustment in Babergh, 1991-2020

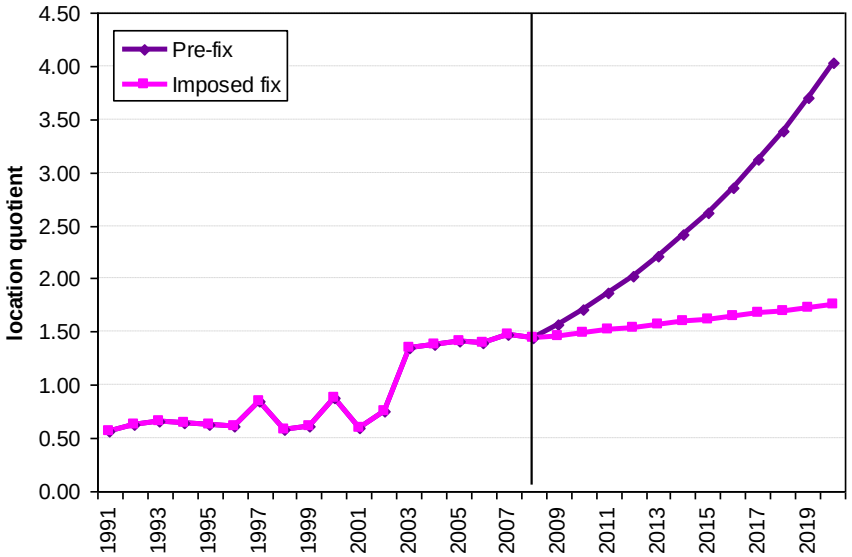
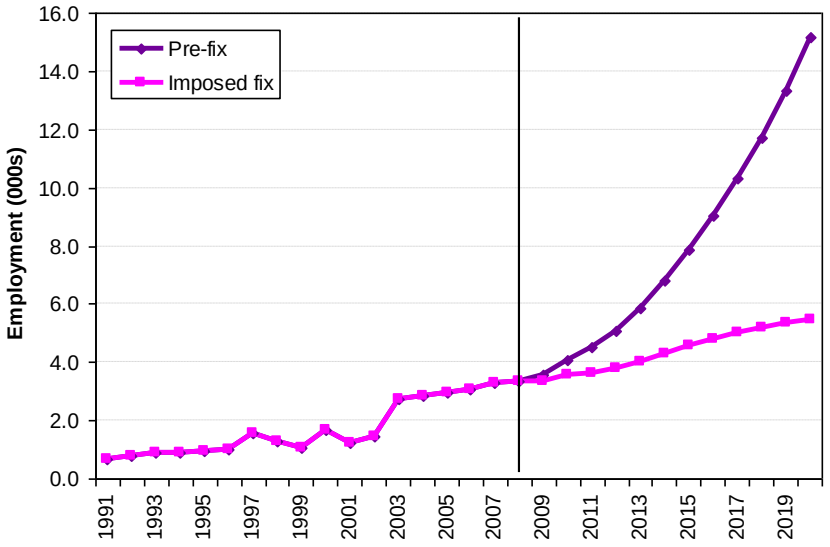


Figure 3.3 shows how these trends translate into actual jobs growth. It is clear that an uncritical acceptance of automated trends would have a substantial, implausible impact on longer-term employment forecasts for an area.

Cambridgeshire County Council and Oxford Economics would like to encourage Local Authorities to view and give feedback on the forecast trends for their areas. We regard such feedback as essential to ensure the EEFM is as credible and as accurate as possible. Chapter 5 (Table 5.1) records the instances where well-evidenced local intelligence on employment trends has been used to modify initial EEFM assumptions.

Figure 3.3: Employment in labour recruitment before and after manual adjustment in Babergh, 1991-2020



Oxford Economics' Regional Model has employee forecasts linked to a wide range of variables - for example, a region's wages and rents relative to those in London, which is particularly important as an influence on financial and business services employment. These are not replicated in the EEFM, although there is obviously an indirect link in that Regional Model employee growth forecasts in a given sector in the East of England must be allocated by the EEFM to the region's local authorities.

Both the Regional Model and the EEFM incorporate links between employment, migration and unemployment. The details of this are explained below.

Full-time and part-time employment

The total number of jobs in an area, broken down into full- and part-time jobs.

East of England shares of part-time employees among all employees in the 31 EEFM sectors (which are trend forecasts linked to regional and national projections) are applied to the workplace employee estimates described above. Full-time employees are simply the total of employees minus the part-time employees for each of the 31 sectors.

Workplace self-employment (jobs)

The total number of self-employed jobs in an area.

Self-employment data for the East of England in Oxford Economics' Regional Model comes from ONS's Labour Force Survey / Annual Population Survey. Previously, self employment data at a regional level was not available by sector, however the ONS now publishes this information.

Self-employment data for local authorities is Census-based, and scaled to the East of England self-employed jobs estimates from the Regional Model. It is broken down by the 31 EEFM sectors. The sectors are forecast using the growth in the sectoral employees in employment data and the estimates are scaled to the Regional Model's estimate of self-employment by sector for the East of England.

Total workplace employment (people)

The total number of people in employment in an area, including both residents and commuters. A person who has more than one job is only counted once, so total workplace employed people is smaller than total workplace employment.

The employment data from the Business Register and Employment Survey (BRES) over the years 2008-12 (and the Annual Business Inquiry (ABI) for earlier years) which is used in the Model measures jobs rather than workers. Because a model aiming to simulate housing demand needs to focus on people, we have to convert the total number of jobs in an area into numbers of employed people.

The 2001 and 2011 Census results give the number of people in employment in an area. For other years, we use BRES / ABI data to estimate residents in employment using the full-time and part-time projections (see above). Individuals are assumed to hold only one full-time job each. Part-time jobs are assumed to account for 0.75 of a full-time job, and self-employed people are assumed to account for 0.93 of a self-employed job. A simple adjustment is made to scale the indicator so it is consistent with the Census.

This measure is not forecast, but derived from the forecasts of jobs discussed above.

Total workplace employment (jobs)

The total number of employee jobs and self-employed jobs in an area. These can be taken by residents or commuters from outside. Note that this includes all full- and part-time jobs, so if someone has two part-time jobs, they are counted twice.

This is not forecast separately in the EEFM, but derived by summing the workplace-based employee jobs and self-employed jobs forecasts described above, and then adding in a constant for the Armed Forces (see below). (Note: Armed Forces data are added to the public administration & defence sector.)

Residence employment

The total number of employed people living in an area. This includes residents who commute elsewhere to work.

Residence employment is based on a commuting matrix taken from the 2011 Census. This matrix tells us, for any given area, where its residents work. Using this information, each available job (see workplace employment (people) above) is allocated to a resident of one of the authorities with which the area has commuting links, in proportion to the strength of that link. This method assumes that commuting patterns do not change over time.

Net Commuting

The number of people commuting into an area for work, less the number of residents commuting out.

Net commuting requires no specific forecasting method. It is the residual between an area's residence-based and workplace-based estimates of numbers of people in employment. (These variables are used to check the realism of the EEFM's workplace- and residence-based employment forecasts, and can occasionally lead to manual adjustments to the Model.)

Our broad assumption is that commuting flows over the forecast period are in line with past trends. Major changes in transport infrastructure, or significant new housebuilding in an area, may bring about changes in commuting patterns, but as indicated in Chapter 2, the EEFM can only take account of such changes if they are reflected in the available data.

Claimant unemployed

The total number of people in an area without a job and claiming unemployment benefits

The number of unemployed people is projected as:

- the previous year's value
- **plus** 0.55 X (projected change in working-age population)
- **minus** 0.45 X (projected change in resident employment)

The two coefficients were obtained by Oxford Economics after an iterative process to produce the most plausible forecasts for unemployment – and, indirectly, migration. Both are less than one, reflecting the fact that many people adding to the local working age population go into education (e.g., students) or directly into employment (e.g., by moving to the area specifically to take up a new job), and the fact that many new job vacancies in the area will not necessarily be filled by the local unemployed (e.g., migrants, commuters).

(Note: in some districts, the coefficient of working-age population, 0.55, produces implausible results – for example, in suburban areas where population change may be unrelated to employment change. In these situations, a different value is manually introduced into the Model.)

ILO unemployment is also included in the Model and comes from the Annual Population Survey. This data is available for 2004-2013 and is both back-cast and forecast, using growth rates in the claimant series.

Gross Value Added (GVA)

The total sum of income generated in an area over a specified period, usually a year. It is the sum of wages, profits and rents. An alternative and equivalent definition is the value of gross output less purchases of intermediate goods and services.

GVA forecasts are available for 31 sectors in Oxford Economics' Regional Model. Previously, a sector entitled 'ownership of dwelling' (imputed rents in the ONS National Accounts) was excluded from the overall business services sector and published as its own sector. In Summer 2011, the ONS changed its methodology to publish data which included imputed rents within the business services sector. To remain consistent with National data, the EEFM now includes this measure of GVA within the real estate sector.

Sub-regionally, limited sector GVA data is available at NUTS 3 level (i.e. for unitaries and shire counties) but not for local authorities. Our initial forecasts at this level are obtained by multiplying forecast regional GVA per job in a sector (from the Regional Model) by forecast total workplace employment (jobs) in that sector (from the EEFM) for each local authority.

These initial forecasts are then subject to two adjustments. The first is for wage differentials (from ONS's Annual Survey of Hours and Earnings), which has the effect of increasing GVA disproportionately in areas where wages are higher. The second scales local sector GVA to the most recent published NUTS 3 level GVA estimates for the relevant base year (2010).

Productivity

GVA divided by total workplace employment (jobs). It measures the average amount of income generated in each area by every person working there.

Productivity estimates do not require specific forecasting. They are simply forecast sector GVA divided by forecast total jobs (both employee and self-employed) in that sector.

Relative productivity is simply productivity in a specified area, divided by productivity in the region. A relative productivity value greater than 1.0 implies that productivity in that area (and sector) is higher than the regional average, and vice versa.

Demographic variables

Total population

The total number of people living in an area

All population data is taken from ONS's mid-year estimates (MYE). Population at regional level is forecast using official projections of natural increase, plus Oxford's projected numbers of migrants (broken down by domestic and international). At local level, total population is forecast as last year's population plus natural increase plus net migration (domestic and international).

Working age population

The total number of people in an area that are aged 16-64 (note: in the EEFM 2013 update the definition of working age was changed, previously it was defined as all people aged 16-retirement age, however this data is no longer published by the ONS leading to the decision being made to change the definition of working age)

Working age population for the region is calculated using official projections of natural increase in the working age population and Oxford's forecast of net migration of working age people (see below).

For local areas, forecast working age population is forecast total population multiplied by a ratio of working age to total population. This ratio is forecast for each year of the forecast period, and calculated as the *previous year's* ratio multiplied by the growth in the ratio regionally according to the ONS (2012-based) projections.

Young population

The total number of children in an area (defined as all people aged 0-15)

The population aged under 16 years is forecast at local authority level using an annual ratio of children to working age people. This ratio is forecast for each year of the forecast period, and calculated as the *previous year's* ratio multiplied by the growth in the ratio regionally according to the ONS (2012-based) projections. The regional forecast for this variable is simply the sum of these local area forecasts.

Elderly population

The total number of elderly people in a given area (defined as all people aged 65+). Note this definition has changed in line with the changes to the definition of working age people (see above)

The local elderly population forecasts are simply the residual of the total population when the young and working age populations are subtracted. The regional forecast for this variable is simply the sum of these local area forecasts.

Migration

The net flow of people moving into and out of an area, whether this be to/from other parts of the region, the UK or the world. A negative number signifies a net outflow of people from an area, a positive number a net inflow.

- Regional migration:

This comes from the Oxford Economics Regional Model, in which forecast net migration of *working age* people into the East of England in any given year is a function of:

- Working age net migration into the UK
- Difference in unemployment rates between the East of England and the UK
- Ratio of the East of England's house prices to those in London
- Ratio of the East of England's average wages to those in London

Total net migration into the region in any given year is forecast as the sum of forecast working age migration, plus a *constant* annual figure for other migrants.

- Local migration:

  Migration data is sourced from ONS's population mid-year estimates 'Components of Change' data. The forecasting methodology is more complex, and not the same as the regional forecasting methodology described above. At local authority level, the number of migrants is the sum of two components: *economic migrants* and *non-economic migrants*.

Note: in the EEFM 2014 update, we have re-estimated the coefficients used in the economic migrant equations to reflect recent trends in migration.

The number of *economic migrants* into each area in any given year equals:

- previous year's population
- **multiplied by** ([0.01 - (0.0016 X previous year's relative unemployment rate differential from the region unemployment rate)] where the unemployment rate has working age population as the denominator)

This formula implies that the number of migrants into a district will equate to 1.0% of last year's population if the difference between local and regional unemployment rate then was zero. Unemployment rates below 3% will result in net in-migration, whereas unemployment rates above 3% will lead to net out-migration. To illustrate with a worked example, in an area with 100,000 people and a 0.1pp positive difference in relative unemployment rate, net migration the following year will be 100,000 X [0.01 - (0.0016 X 0.1)], or 100,000 X [0.01 – 0.00016], or 100,000 X 0.00984, or 984.

So any change in employment or population in the EEFM which affects unemployment - whether the change is externally-sourced or internally generated within the Model - will affect net migration.

Non-economic migrants are set as a constant - unique to every area - for all future years. The constant for a given local authority is selected on the basis that it both reflects the actual population trend for the area over 1991-2013 (from ONS) and implies a local employment rate trend consistent with that for the region as a whole.

Housing variables

Households

The total number of households (as defined in official statistics) in an area

Demand for dwellings

The total number of dwellings (as defined in official statistics) in an area

The initial household data are as presented in the official DCLG series. The initial dwellings data are the stock data presented in the official DCLG series (table 125 provides total dwelling stock, whilst table 615 provides vacant stock, the residual between these series therefore represents occupied dwelling stock). The methodology for forecasting households and dwellings has undergone two key changes from that which was applied when the model was originally developed. When the EEFM was first developed, household numbers were originally forecast by projecting both population (using the methodology described earlier) and the ratio of households to population (from the Chelmer forecasts). From this it projected dwellings (using Chelmer forecasts of the number of dwellings per household, allowing for empty dwellings, second homes, etc.).

However, in the EEFM's Autumn 2008 run, Oxford Economics felt the Chelmer-based projections lacked credibility and the process of forecasting these two variables was modified, which became as follows:

First, we forecast the number of *occupied* dwellings directly from population by projecting the ratio of occupied dwellings to population using the linear trend identified by Oxford Economics for the period 1997 – 2007.

Having calculated occupied dwellings, we use a ratio of total to occupied dwellings (calculated by Oxford Economics from the most recent data available) in order to project *total* dwelling stock. We call this *"demand for dwellings."* It is intended to proxy dwelling stock, but it is not a conventional stock or supply figure. Rather it tries to estimate what stock might be needed to accommodate the projected number of people, using Oxford Economics' occupancy rate assumptions.

Meanwhile, to produce *household forecasts*, we divide the forecast numbers of occupied dwellings by Chelmer estimates of the ratio of occupied dwellings to households. (Note that although there is a separate Chelmer estimate for each local authority, it is a constant, so will not capture possible changes locally over time.)

In the EEFM 2013 update, we made one further adjustment to the forecast for these two variables. In recent years, the occupancy ratio of dwelling stock in the East has stalled its downward trend. This has largely been brought about by the impact of the recession and sluggish economic growth since. We believe that this trend in occupancy rates is due to rising unemployment, falling real incomes and the resulting lower levels of house-building as well as lower rates of mortgage lending. These factors are of course interrelated, but the impact on occupancy rates are clear where young people are staying at home for longer due to the inability to obtain a mortgage. Another factor is the recent influx of migrants who tend to live at higher densities despite the impacts of the recession.

As such, Oxford Economics estimate that occupancy rates are likely to fall at a slower pace for a number of years, before reverting to the pre-recession downward trend over the longer term. We believe that by once the economic recovery is more sustained, unemployment rates will have decreased sufficiently such that banks will be starting to lend at a similar rate to the period prior to the recession and the rate of house-building is likely to pick up again to meet the demand for housing from the local population.

Carbon emissions

Industry, commercial & energy emissions

The amount of CO2 emissions produced by the industrial, commercial & energy sector in an area in any given year

Data for the amount of CO2 emissions produced by the industry, commercial & energy sector is published by the Department of Energy and Climate Change (DECC) by local authority.

Local authority CO2 emissions forecasts within the industry, commercial & energy sectors were produced by first creating UK carbon weights by industrial sector. This was done using sectoral employment and carbon emissions forecasts from the Oxford Economics Industry Model (OEIM) (note that OE UK carbon emissions forecasts are consistent with the DECC projections). By dividing the emissions in a sector by the number of people in employment in that sector, then dividing this by the emissions for the average UK worker (total UK emissions divided by total UK employment), we are able to get weights showing how carbon intensive specific sectors are.

For each local authority, we then calculate a carbon weighted employment figure based on what the employment breakdown in that area is. So a district which employs significantly more of their workforce in the emissions intensive chemicals and processing industries sector would be forecast to have a higher carbon weighted employment figure than a district which had a large agricultural sector.

This carbon weighted figure is then multiplied by the average emissions per UK employee, to give a pre-adjusted industrial & commercial emissions forecast. The pre-adjusted forecast also takes into account emissions from the energy sector. These emissions are forecast from the OEIM, and we have modelled the energy sector as having no employees as such. Otherwise, we could have a problem where a district with a high number of energy sector employees could be a head office and not really emitting much carbon. So we share the energy sector emissions across districts by multiplying UK energy sector emissions by each district's share of total UK employment.

Finally, we adjust our forecasts based on scaling factors capturing the differences between our calculations for 2005-12 and the 2005-12 DECC data.

Domestic emissions

The total number of emissions produced by households in an area in any given year

Data for the amount of CO2 emissions produced by the domestic sector is published by the Department of Energy and Climate Change (DECC) by local authority.

Local authority CO2 emissions forecasts within the domestic sector are assumed to be a function of population (for example, more people means more households and therefore more domestic energy use). We have calculated the UK average level of domestic emissions per person by taking the total UK household emissions and dividing by UK total population from the OEIM. Then we applied this UK domestic emissions per person ratio to the local authority population forecasts in the EEFM to estimate a pre-adjusted domestic emissions forecast by local authority. Then we adjusted the forecasts based on scaling factors capturing the differences between our calculations for 2005-12 and the DECC data during the same years.

Transport emissions

The total number of emissions produced by the transport sector in an area in any given year

Data for the amount of CO2 emissions produced by the transport sector is published by the Department of Energy and Climate Change (DECC) by local authority.

Local authority CO2 emissions forecasts within the transport sector are assumed to be a function of GVA (for example, more output means more transport use and therefore more emissions from transport). We have calculated the UK average level of transport emissions per unit of GDP by taking the total UK transport emissions and dividing by UK total GDP from the OEIM. Then we applied this UK transport emissions per person ratio to the local authority GVA forecasts in the EEFM to estimate a pre-adjusted transport emissions forecast by local authority. Then we adjusted the forecasts based on scaling factors capturing the differences between our calculations for 2005-12 and the DECC data during the same years.

Land use, land use change and forestry (LULUCF) emissions
The total number of emissions produced via land use (e.g. deforestation, emissions from soils, etc.) in an area in any given year

Data for the amount of CO2 emissions produced by the LULUCF sector is published by the Department of Energy and Climate Change (DECC) by local authority.

Local authority CO2 emissions forecasts within the LULUCF sector are assumed to be a function of land area i.e. more land gives more potential for deforestation, emissions from soils, etc. We have taken land area data, measured in hectares, from the UK Standard Area Measurements for 2007, and assumed that these values have not changed over time. Then we took UK LULUCF emissions data from DECC for 2005-12, and DEFRA forecasts for 2010, 2015 and 2020. For the years in between, we assumed a straight line and extrapolated annual data points and beyond 2020 we assumed a continuation of the trend. Then, using data from DECC for 2005-12, we projected the local authority LULUCF emissions by taking the previous year's emissions, and adding the local authority share (calculated by taking each area's share of total UK land area) of the net change in UK LULUCF emissions in each year.

Total emissions
The total number of CO2 emissions produced in an area in any given year

This is calculated as an aggregate of industry, commercial & energy emissions, domestic emissions, transport emissions and LULUCF emissions.

4: Data used

Labour market

Employees in employment

Description: Annual average employee job estimates

Data: 1991 – 1995 Annual Employment Survey (AES)
1995 – 1997 Annual Employment Survey rescaled to ABI
1998 – 2008 Annual Business Inquiry (ABI)
2008 – 2012 Business Register and Employment Survey (BRES)
2013 – ONS Workforce Jobs (WFJ)

Latest data:
Regional and UK data: 2013
Local authority data: 2012

Next release:

Regional data:	BRES 2013 results, available September 2014
	ONS Workforce Jobs Q2 2014, available September 2014
Local authority data:	BRES 2013 results, available September 2014

There are two key sources for the employee jobs data used in the EEFM – ONS Workforce Jobs (WFJ) and the Business Register and Employment Survey (BRES).

- The WFJ series is reported on a quarterly basis, providing estimates of employee jobs by sector (based on the 2007 Standard Industrial Classification – SIC 2007) for the UK and its constituent government office regions, over the period 1981 Q3 to 2014 Q1.
- The BRES is an employment survey which has replaced the Annual Business Inquiry (ABI). Similar to WFJ, BRES data is based upon the SIC 2007, but it is only published for the years 2008-12. Prior to this, ABI data is available for employee jobs data, however this is based on the old industrial classification (SIC 2003). In contrast with WFJ, BRES data are available at a more disaggregated level of detail – i.e. estimates of employee jobs are available at local authority level and more detailed sector definitions. It is worth noting that the BRES is first and foremost a survey and is therefore subject to volatility, particularly when the level of detail becomes more refined (this is discussed in more detail in Chapter 5). The survey is collected in September of each year and not seasonally adjusted.

UK employee jobs data is taken directly from the ONS WFJ series, where annual averages are estimated from the quarterly data.

There are a number of steps in constructing regional employee jobs, due to changes in sectoral classifications across the various sources, and restrictions on data availability over particular periods of time. Initially, we take employee jobs data for each sector directly from the BRES over the years 2008-12. This relates to September figures and is based upon SIC 2007 sectors.

WFJ data of employee jobs by SIC 2007 sector is available between 1981 Q1 and 2014 Q1. Using this, we are able to construct an annual series of employee jobs by sector for each region over the period 1981-2013 (annual averages are estimated by taking the average of the quarterly data for each year). This, in turn,

enables the backcasting of the 2008 BRES data to 1981. Subsequently, the 2012 BRES data is projected forward for 2013 using growth rates for each sector in the WFJ series to provide a more robust estimate of employee jobs growth in that year.

To ensure the regional series is consistent with the UK employee jobs series, an adjustment factor is applied to all sectors, which converts the data to annual average values (seasonally adjusted).

The final step in estimating employee jobs in each region, government supported trainees (GST) is allocated to each sector. This is published by the ONS on a sectoral basis in the WFJ series. As such GST is simply added to the estimate of employee jobs in each region.

Table 4.1 below shows a comparison between the BRES series of September based employee jobs including GST in 2012, with the level of employee jobs used in the EEFM for the East region in the same year. The percentage difference shows the adjustment made which converts the BRES data to an annual average value.

Table 4.1: Employee jobs (incl. GST), WFJ and EEFM, 2012

	BRES, 2012 (000s)	EEFM 2012 (000s)	% difference
A : Agriculture	27.7	26.1	-5.7%
B : Mining & quarrying	1.3	1.3	-2.8%
C : Manufacturing	235.4	225.1	-4.4%
D : Electricity & gas supply	5.5	5.4	-1.1%
E : Water supply, waste & remediation	19.5	19.4	-0.7%
F : Construction	126.0	126.1	0.1%
G : Wholesale	430.8	436.5	1.3%
H : Transportation & storage	119.7	121.0	1.1%
I : Hotels & restaurants	155.9	155.0	-0.6%
J : Information & communications	83.2	83.9	0.9%
K : Finance	64.3	65.1	1.3%
L : Real estate activities	36.6	36.6	0.0%
M : Professional, scientific & technical activities	181.5	182.0	0.3%
N : Administrative & support service activities	230.3	226.6	-1.6%
O : Public administration & defence	99.2	96.1	-3.2%
P : Education	242.4	236.3	-2.5%
Q : Health	282.5	286.7	1.5%
R : Arts & entertainment	56.1	56.1	-0.1%
S : Other service activities	36.0	39.2	8.8%
Total	**2422.6**	**2424.2**	**0.1%**

Source: ONS Workforce Jobs, BRES, Oxford Economics

For employee jobs data at local authority level, the construction of the series follows a similar method to that applied to constructing the regional series. We take employee jobs by sector over the years 2008-12 from the BRES.

Note that for the agriculture sector, the BRES series excludes employees working in farm agriculture (defined as SIC01000). However, these employees were included in the ABI series published up until 2008, and are also included in the regional WFJ series. In the absence of further information, we take the 2008 ratio of employee jobs in the agriculture sector in each local authority to regional agriculture jobs from the ABI, then hold this constant over the years 2009-12 and apply this ratio to agriculture employee jobs according to WFJ to obtain a reasonable estimate of agriculture employee jobs in each local authority over the period 2009-13.

Prior to 2008, published data on employee jobs is only available based on the 2003 sectoral classifications (from the ABI). Using a data matrix published by the ONS which shows the key changes in sectoral definitions between SIC 2003 and SIC 2007, Oxford Economics have conducted a mapping exercise which has allowed for SIC 2003 sectors to be closely aligned with the new SIC 2007 classification. This has enabled further backcasting of data prior to 2008, resulting in a full time series of employee jobs levels

between 1991-2012, which relates to September based figures (since the BRES series used as the starting point is also September based).

To ensure consistency with the employee jobs series elsewhere in the Oxford Economics suite of models, we adjust the local series to represent annual average values. The percent adjustments applied to the BRES data are shown in table 4.2 below for 2012 allowing model users to see the level of adjustment which has been applied. The adjustments shown here are for the East region and are applied across all local authorities in the East. That is to say that the 0.1% adjustment to construction in 2012 has been applied to the number of construction jobs in each local authority in the East with no exceptions.

Note: for the East Midlands areas, the adjustment factors were estimated in the same way, but using East Midlands data as the basis of the calculation, and a similar method was applied for the South East areas.

Table 4.2: Percentage adjustments applied to BRES data in all local authorities in the East

	BRES 2012 (000s)	EEFM adjusted 2012 (000s)	% difference
Agriculture	27.7	26.1	-5.7%
Mining and Quarrying	1.3	1.3	-2.8%
Food Manufacturing	28.8	29.3	1.8%
General Manufacturing	65.5	65.6	0.1%
Chemicals excl. pharmaceuticals	26.5	26.3	-0.8%
Pharmaceuticals	6.1	6.1	0.3%
Metals manufacturing	32.6	32.8	0.6%
Transport equipment, machinery & equipment, etc	42.2	42.4	0.6%
Electronics	22.6	22.5	-0.1%
Utilities	11.1	11.4	2.8%
Waste and remediation	13.8	13.3	-3.7%
Construction	126.0	126.1	0.1%
Wholesale	164.0	163.8	-0.1%
Retail	266.8	272.7	2.2%
Land Transport	113.9	115.5	1.4%
Water and air transport	5.8	5.5	-4.4%
Hotels and restaurants	155.9	155.0	-0.6%
Publishing and broadcasting	17.3	18.5	6.7%
Telecoms	17.1	17.9	4.9%
Computer related activity	48.8	47.5	-2.7%
Finance	64.3	65.1	1.3%
Real Estate	36.6	36.6	0.0%
Professional services	162.7	162.7	0.0%
Research & development	18.8	19.3	2.9%
Business services	132.4	137.2	3.7%
Employment activities	97.9	89.3	-8.7%
Public administration	99.2	96.1	-3.2%
Education	242.4	236.3	-2.5%
Health and care	282.5	286.7	1.5%
Arts and entertainment	56.1	56.1	-0.1%
Other services	36.0	39.2	8.8%
Total	**2422.6**	**2424.2**	**0.1%**

Source: BRES, ONS Workforce Jobs, EEFM

Full-time/part-time split

Description: Annual average full-time and part-time employee job estimates consistent with the employee job estimates above.

Data: 1991 - 1995 Annual Employment Survey (AES)
1995 - 1997 Annual Employment Survey rescaled to ABI
1998 - 2008 Annual Business Inquiry (ABI)
2008 – 2012 Business Register and Employment Survey (BRES)

Latest data:
Regional data: 2012
Local authority data: 2012

Next release:

Regional data:	BRES 2013 results available September 2014
Local authority data:	BRES 2013 results available September 2014

The EEFM draws its data on full-time and part-time employees in employment from the BRES over the years 2008-12, and the ABI in earlier years. These figures relate to September, whereas those in the Oxford Regional Model use annual average figures (from WFJ). The proportion of part-time employees within each sector is applied to the scaled employees estimates described above. This produces estimates of part-time employee jobs, and since the employee jobs which the part times shares are applied to are themselves annual averages, this converts the estimates of part time employee jobs to annual average values. Full-time employee jobs are calculated by subtracting the part-time estimates from the total, and are therefore annual average values.

Self-employment

Description: Annual average self-employment job estimates

Data:	ONS Workforce Jobs (WFJ) Census 2001 and 2011 for local area estimates
Latest data:	Regional - 2013 Local authorities - 2012
Next release:	Regional data: ONS Workforce Jobs Q2 2014, available September 2014 Local authorities: 2013 data available September 2014

Self-employment data at local level is published in the Annual Population Survey. However, due to sampling errors, the data are volatile, and even in cases where moving averages are used to smooth them out, the level of inaccuracy in the series remains a problem. Oxford Economics estimates self-employment at a sectoral level, using regional employee jobs / self-employment ratios, applying them to the local authority employee jobs series, and finally scaling to total self-employment figures from the Census 2001 and 2011 results.

Self-employment data by sector for the UK and its regions is now published by the ONS in its Workforce Jobs series (WFJ) where data is available on a quarterly basis over the period 1996 Q1 until 2014 Q1. Annual average self employment levels are estimated by taking the average of jobs levels in each quarter of each year. Previously this was estimated by Oxford Economics as sectoral level data was not publicly available.

Prior to 1996, Oxford Economics backcast data by applying growth rates in the self employment series which were used previously in the OE Regional Model. Since the previous self employment series was based on SIC 2003 definitions, we apply the growth rates in the sector which is most closely aligned with the new SIC 2007 sector. For example, the professional services and real estate sectors (both SIC 2007 based) are backcast using growth rates in the overall (SIC 2003 based) business services sector.

Self-employment data for local areas in the EEFM is constructed as follows:

1: Using the regional data described above, ratios of self-employment to employees in employment are calculated. These are then applied to local area employees in employment data for all 31 EEFM sectors. This gives an initial estimate of self-employment by sector in local areas.

2: These initial estimates are scaled to the self-employment totals from the 2001 and 2011 Census results. The scaling factor is held constant across all years to produce a time-series estimate of self-employment by sector which is consistent with the Census results.

3: Finally, this self-employment series is scaled again, this time to the regional sector series described above. This converts the data from people-based to jobs-based estimates, and ensures that the EEFM sector data at local level sum to the regional sector data.

Table 4.3 compares self-employment data for 2011 from the Census with the scaled series used in the EEFM.

Table 4.3: Comparison of self-employment data with EEFM data, 2011

	Census data (000s, 2011)	EEFM scaled data (000s, 2011)	Difference 2011
Babergh	7.7	7.2	-5.9%
Basildon	12.3	11.4	-7.4%
Bedford	10.6	10.1	-4.7%
Braintree	11.8	11.2	-5.1%
Breckland	9.3	8.7	-6.5%
Brentwood	6.3	6.0	-3.9%
Broadland	9.4	8.9	-4.9%
Broxbourne	7.4	7.0	-5.4%
Cambridge	8.6	8.3	-3.1%
Castle Point	6.4	6.2	-4.5%
Chelmsford	12.7	12.1	-4.4%
Colchester	12.0	11.6	-3.6%
Dacorum	11.8	11.3	-3.8%
East Cambridgeshire	6.8	6.4	-5.8%
East Hertfordshire	11.6	11.1	-4.3%
Epping Forest	11.8	11.2	-4.9%
Fenland	6.4	6.0	-6.7%
Forest Heath	4.2	3.9	-5.7%
Great Yarmouth	5.8	5.5	-5.1%
Harlow	5.1	4.9	-4.0%
Hertsmere	9.7	9.3	-4.1%
Huntingdonshire	11.7	11.1	-5.0%
Ipswich	7.6	7.3	-4.0%
King's Lynn and West Norfolk	10.6	9.9	-6.9%
Luton	11.7	11.2	-4.2%
Maldon	5.7	5.4	-5.7%
Mid Bedfordshire	10.2	9.7	-4.7%
Mid Suffolk	8.6	8.1	-6.1%
North Hertfordshire	9.8	9.3	-4.7%
North Norfolk	9.4	8.8	-6.3%
Norwich	9.1	8.8	-3.5%
Peterborough	10.3	9.9	-4.2%
Rochford	6.3	6.0	-5.5%
South Bedfordshire	9.4	9.0	-4.8%
South Cambridgeshire	12.0	11.5	-4.4%
South Norfolk	10.2	9.6	-5.8%
Southend-on-Sea	12.3	11.8	-4.0%
St Albans	11.6	11.2	-3.4%
St Edmundsbury	8.0	7.6	-4.6%
Stevenage	5.4	5.2	-4.1%
Suffolk Coastal	10.0	9.4	-5.7%
Tendring	9.3	8.8	-5.8%
Three Rivers	7.5	7.2	-3.9%
Thurrock	9.7	9.2	-5.3%
Uttlesford	8.0	7.6	-5.2%
Watford	7.1	6.8	-3.4%
Waveney	7.3	6.9	-5.5%
Welwyn Hatfield	7.7	7.4	-4.1%
East of England	**434.6**	**413.5**	**-4.9%**

Source: Census, Oxford Economics

Employees in Armed Forces

Description: Annual average estimate of employees in UK regular Armed Forces stationed in the UK

Data: DASA, ONS Workforce Jobs
Latest data: 2012
Next release: 2013

Regional data on employees in UK Armed Forces is taken from the ONS WFJ series. This provides data on a quarterly basis, from which Oxford Economics derive annual averages.

Local authority level data on employees in UK Armed Forces is taken from DASA, which is scaled to ensure that it is consistent with the regional level data from WFJ. The EEFM adds this number to total employment in public administration and defence as a constant in every forecast year. US Armed Forces do not appear in *any* EEFM employment forecasts. UK civilian employees on UK and USAF bases in the region *are* included in both total and sector forecasts - under 'public administration and defence' – as are US civilian employees in certain limited circumstances.

Table 4.4 below shows the local authority level data for the East areas for 2012, and the final data published in the EEFM. The difference in all areas represents the adjustment applied which ensures that the local data is fully consistent with the regional and UK data.

Table 4.4: Comparison of employees in forces data with EEFM data, 2012

	DASA data (000s, 2012)	EEFM scaled data (000s, 2012)	Difference (000s)
Babergh	0.0	0.0	0.0
Basildon	0.0	0.0	0.0
Bedford	0.0	0.0	0.0
Braintree	0.0	0.0	0.0
Breckland	0.5	0.5	0.0
Brentwood	0.0	0.0	0.0
Broadland	0.0	0.0	0.0
Broxbourne	0.0	0.0	0.0
Cambridge	0.0	0.0	0.0
Castle Point	0.0	0.0	0.0
Chelmsford	0.0	0.0	0.0
Colchester	3.2	3.2	0.0
Dacorum	0.0	0.0	0.0
East Cambridgeshire	0.0	0.0	0.0
East Hertfordshire	0.0	0.0	0.0
Epping Forest	0.0	0.0	0.0
Fenland	0.0	0.0	0.0
Forest Heath	0.0	0.0	0.0
Great Yarmouth	0.0	0.0	0.0
Harlow	0.0	0.0	0.0
Hertsmere	0.0	0.0	0.0
Huntingdonshire	0.5	0.4	0.0
Ipswich	0.0	0.0	0.0
King's Lynn and West Norfolk	2.6	2.6	0.0
Luton	0.0	0.0	0.0
Maldon	0.0	0.0	0.0
Mid Bedfordshire	1.5	1.5	0.0
Mid Suffolk	1.5	1.5	0.0
North Hertfordshire	0.0	0.0	0.0
North Norfolk	0.0	0.0	0.0
Norwich	0.0	0.0	0.0
Peterborough	1.3	1.3	0.0
Rochford	0.0	0.0	0.0
South Bedfordshire	0.0	0.0	0.0
South Cambridgeshire	1.4	1.4	0.0
South Norfolk	0.0	0.0	0.0
Southend-on-Sea	0.0	0.0	0.0
St Albans	0.0	0.0	0.0
St Edmundsbury	1.8	1.8	0.0
Stevenage	0.0	0.0	0.0
Suffolk Coastal	0.7	0.6	0.0
Tendring	0.0	0.0	0.0
Three Rivers	1.1	1.1	0.0

Thurrock	0.0	0.0	0.0
Uttlesford	0.8	0.8	0.0
Watford	0.0	0.0	0.0
Waveney	0.0	0.0	0.0
Welwyn Hatfield	0.0	0.0	0.0
East of England	**17.0**	**17.0**	**-0.1**

Source: DASA, ONS Workforce Jobs, Oxford Economics

Unemployment

Description: Annual average claimant count unemployment – seasonally adjusted

Data: Local authorities: Nomis – Claimant count with rates and proportions
Region: Nomis – Claimant count with rates and proportions

Latest data: 2013

Next release: 2014, Spring 2015

Note: annual average values are calculated from the monthly data.

Table 4.5 compares the raw unemployment data with the scaled series used in the EEFM.

Table 4.5: Comparison of unemployment data with EEFM data, 2013

	NOMIS data (000s 2013)	EEFM scaled data (000s, 2013)	Difference (000s)
Babergh	1.08	1.09	0.00
Basildon	4.29	4.31	0.02
Bedford	3.89	3.91	0.02
Braintree	2.29	2.30	0.01
Breckland	2.03	2.04	0.01
Brentwood	0.81	0.82	0.00
Broadland	1.28	1.29	0.01
Broxbourne	1.75	1.75	0.01
Cambridge	1.46	1.46	0.01
Castle Point	1.39	1.40	0.01
Chelmsford	2.50	2.51	0.01
Colchester	2.84	2.85	0.01
Dacorum	1.96	1.97	0.01
East Cambridgeshire	0.98	0.98	0.00
East Hertfordshire	1.48	1.48	0.01
Epping Forest	2.02	2.03	0.01
Fenland	1.86	1.87	0.01
Forest Heath	0.79	0.79	0.00
Great Yarmouth	3.38	3.39	0.01
Harlow	2.27	2.28	0.01
Hertsmere	1.39	1.39	0.01
Huntingdonshire	1.99	2.00	0.01
Ipswich	3.56	3.58	0.02
King's Lynn and West Norfolk	2.63	2.65	0.01
Luton	5.30	5.33	0.02
Maldon	0.81	0.81	0.00
Mid Bedfordshire	1.53	1.54	0.01
Mid Suffolk	0.96	0.96	0.00
North Hertfordshire	1.79	1.80	0.01
North Norfolk	1.35	1.35	0.01
Norwich	4.07	4.09	0.02
Peterborough	5.67	5.69	0.02
Rochford	1.00	1.01	0.00
South Bedfordshire	1.99	1.99	0.01
South Cambridgeshire	1.11	1.11	0.00
South Norfolk	1.39	1.39	0.01
Southend-on-Sea	4.49	4.51	0.02
St Albans	1.33	1.34	0.01
St Edmundsbury	1.43	1.44	0.01
Stevenage	1.99	2.00	0.01
Suffolk Coastal	1.09	1.09	0.00
Tendring	3.11	3.12	0.01
Three Rivers	0.99	1.00	0.00
Thurrock	3.96	3.97	0.02
Uttlesford	0.63	0.63	0.00

Watford	1.65	1.66	0.01
Waveney	2.61	2.62	0.01
Welwyn Hatfield	1.62	1.63	0.01
East of England	**101.78**	**102.21**	**0.43**

Source: Nomis, Oxford Economics

Residence-based employment

Description: Number of people resident in an area who are in employment (irrespective of where they work)

Data: Local authorities: Census of Population (2001 and 2011)
Annual Population Survey (APS)
Region: Census of Population (2001 and 2011)
Annual Population Survey (APS)

Latest data: 2013

Next release: 2014, available July 2015

The residence employment data used in the EEFM is based on Census and APS data. The resident employment rate from the 2001 and 2011 Census is the key variable used. Prior to 2001, data are extrapolated back to 1994 and forward beyond 2012 using smoothed growth rates from the APS. A moving average of the residence employment rate from the APS data is used here, as the data is volatile at local level. Table 4.6 compares, for 2011, the data used in the EEFM with Census data, and the two series are of course identical.

Table 4.6: Comparison of Census residence-based employment with EEFM data, 2011

	Census 2011 (000s)	EEFM 2011 (000s)	Difference (000s)
Babergh	42.3	42.3	0.0
Basildon	83.0	83.0	0.0
Bedford	75.8	75.8	0.0
Braintree	74.2	74.2	0.0
Breckland	61.3	61.3	0.0
Brentwood	36.3	36.3	0.0
Broadland	61.5	61.5	0.0
Broxbourne	46.2	46.2	0.0
Cambridge	59.4	59.4	0.0
Castle Point	41.4	41.4	0.0
Chelmsford	86.5	86.5	0.0
Colchester	85.6	85.6	0.0
Dacorum	73.4	73.4	0.0
East Cambridgeshire	43.9	43.9	0.0
East Hertfordshire	72.2	72.2	0.0
Epping Forest	61.6	61.6	0.0
Fenland	44.5	44.5	0.0
Forest Heath	31.5	31.5	0.0
Great Yarmouth	41.3	41.3	0.0
Harlow	40.4	40.4	0.0
Hertsmere	49.4	49.4	0.0
Huntingdonshire	89.0	89.0	0.0
Ipswich	65.5	65.5	0.0
King's Lynn and West Norfolk	67.3	67.3	0.0
Luton	89.2	89.2	0.0
Maldon	30.3	30.3	0.0
Mid Bedfordshire	70.9	70.9	0.0
Mid Suffolk	48.6	48.6	0.0
North Hertfordshire	65.0	65.0	0.0
North Norfolk	43.2	43.2	0.0
Norwich	62.4	62.4	0.0
Peterborough	88.0	88.0	0.0
Rochford	40.7	40.7	0.0
South Bedfordshire	61.2	61.2	0.0
South Cambridgeshire	79.1	79.1	0.0
South Norfolk	60.3	60.3	0.0
Southend-on-Sea	81.3	81.3	0.0
St Albans	71.4	71.4	0.0
St Edmundsbury	56.5	56.5	0.0
Stevenage	42.7	42.7	0.0

Suffolk Coastal	58.3	58.3	0.0
Tendring	54.9	54.9	0.0
Three Rivers	44.0	44.0	0.0
Thurrock	77.4	77.4	0.0
Uttlesford	40.8	40.8	0.0
Watford	47.6	47.6	0.0
Waveney	49.2	49.2	0.0
Welwyn Hatfield	53.0	53.0	0.0
East of England	**2,849.5**	**2,849.5**	**0.0**

Source: Census, Oxford Economics

The resident employment rate is calculated dividing the residence employment data in Table 4.6 by the population of ages 16-74. This age range is selected to maintain consistency with the Census. Table 4.7 compares, for 2013, the residence employment rates used within EEFM (which is scaled to the Census) with the raw unsmoothed rates from the APS. The differences are substantial, mainly because the APS uses a working age (16-64) population denominator whereas the EEFM, which is Census-based, uses a 16-74 population denominator. (See chapter 5, which explores other differences between the Census and APS/LFS resident employment rates.)

Table 4.7: Comparison of APS residence-based employment rate with EEFM data, 2013

	APS data (%, 2013)	EEFM scaled data (%, 2013)	Difference (pp)
Babergh	77.0	70.3	-6.7
Basildon	75.6	68.7	-6.9
Bedford	77.0	67.5	-9.5
Braintree	73.1	66.6	-6.5
Breckland	70.3	62.5	-7.8
Brentwood	76.3	65.9	-10.4
Broadland	80.6	70.6	-10.0
Broxbourne	77.3	69.9	-7.4
Cambridge	75.8	61.9	-13.9
Castle Point	70.6	62.9	-7.7
Chelmsford	78.7	72.0	-6.7
Colchester	72.3	65.5	-6.8
Dacorum	74.0	68.3	-5.7
East Cambridgeshire	75.3	69.5	-5.8
East Hertfordshire	81.8	75.0	-6.8
Epping Forest	76.7	73.4	-3.3
Fenland	61.0	61.4	0.4
Forest Heath	78.9	72.5	-6.4
Great Yarmouth	71.2	60.6	-10.6
Harlow	67.3	65.6	-1.7
Hertsmere	76.1	69.5	-6.6
Huntingdonshire	79.0	73.7	-5.3
Ipswich	74.6	68.6	-6.0
King's Lynn and West Norfolk	69.2	61.0	-8.2
Luton	65.0	60.3	-4.7
Maldon	71.8	69.2	-2.6
Mid Bedfordshire	75.7	68.9	-6.9
Mid Suffolk	78.9	68.9	-10.0
North Hertfordshire	72.1	68.4	-3.7
North Norfolk	75.3	60.8	-14.5
Norwich	72.1	62.3	-9.8
Peterborough	69.5	66.5	-3.0
Rochford	75.7	66.3	-9.4
South Bedfordshire	71.7	68.5	-3.2
South Cambridgeshire	79.3	72.7	-6.6
South Norfolk	86.4	74.6	-11.8
Southend-on-Sea	71.2	65.0	-6.2
St Albans	77.2	72.0	-5.2
St Edmundsbury	84.0	74.5	-9.5
Stevenage	83.4	74.1	-9.3
Suffolk Coastal	79.7	65.8	-13.9
Tendring	64.3	55.3	-9.0
Three Rivers	67.0	68.5	1.5
Thurrock	70.7	67.9	-2.8
Uttlesford	84.3	75.1	-9.2
Watford	84.3	77.7	-6.6
Waveney	67.6	58.5	-9.1
Welwyn Hatfield	74.2	67.6	-6.6
East of England	**75.5**	**67.6**	**-7.9**

Source: Census, APS, Oxford Economics

Total workplace employment (people)
Description: the number of people who work in an area (irrespective of where they live)

Data: Local authorities: Census of Population
Region: Census of Population

Latest data: 2011

This series is constructed on the basis that all full-time employee jobs are filled by one person only, but that one person could have two or more part-time jobs. For this reason, we apply a ratio of 0.75 people per part-time job to the total part-time jobs estimate. In other words, 100 part-time jobs implies 75 people in employment, with the remaining 25 part-time jobs taken by people with other part-time (or full-time) jobs. (This ratio is the one most consistent with Census results.)

We convert the self-employed jobs series to a people-based series in a similar way. In this case, we assume a jobs / people ratio of 0.93 – that is, 100 self-employment jobs equates to 93 (self-employed) people in employment. (This ratio is generated from Census data.)

Finally, these estimates are scaled for 2011 to ensure they are consistent with the Census.

Table 4.8: Comparison of Census employment data with EEFM data, 2011

	Census employment, (000s, 2011)	EEFM data (000s, 2011)	Difference (%)
Babergh	35.7	35.7	0.0%
Basildon	82.8	82.8	0.0%
Bedford	74.5	74.5	0.0%
Braintree	57.6	57.6	0.0%
Breckland	50.5	50.5	0.0%
Brentwood	33.9	33.9	0.0%
Broadland	47.3	47.3	0.0%
Broxbourne	38.9	38.9	0.0%
Cambridge	94.2	94.2	0.0%
Castle Point	25.4	25.4	0.0%
Chelmsford	82.6	82.6	0.0%
Colchester	83.7	83.7	0.0%
Dacorum	66.2	66.2	0.0%
East Cambridgeshire	31.1	31.1	0.0%
East Hertfordshire	58.2	58.2	0.0%
Epping Forest	47.6	47.6	0.0%
Fenland	38.2	38.2	0.0%
Forest Heath	32.9	32.9	0.0%
Great Yarmouth	40.0	40.0	0.0%
Harlow	39.8	39.8	0.0%
Hertsmere	46.4	46.4	0.0%
Huntingdonshire	77.4	77.4	0.0%
Ipswich	71.6	71.6	0.0%
King's Lynn and West Norfolk	63.5	63.5	0.0%
Luton	90.0	90.0	0.0%
Maldon	23.0	23.0	0.0%
Mid Bedfordshire	50.9	50.9	0.0%
Mid Suffolk	41.7	41.7	0.0%
North Hertfordshire	52.4	52.4	0.0%
North Norfolk	39.6	39.6	0.0%
Norwich	89.2	89.2	0.0%
Peterborough	101.2	101.2	0.0%
Rochford	26.7	26.7	0.0%
South Bedfordshire	47.3	47.3	0.0%
South Cambridgeshire	74.4	74.4	0.0%
South Norfolk	54.4	54.4	0.0%
Southend-on-Sea	72.1	72.1	0.0%
St Albans	61.5	61.5	0.0%
St Edmundsbury	58.4	58.4	0.0%
Stevenage	44.8	44.8	0.0%
Suffolk Coastal	54.4	54.4	0.0%
Tendring	44.3	44.3	0.0%
Three Rivers	35.4	35.4	0.0%
Thurrock	64.2	64.2	0.0%
Uttlesford	40.3	40.3	0.0%

Watford	51.5	51.5	0.0%
Waveney	45.0	45.0	0.0%
Welwyn Hatfield	68.4	68.4	0.0%
East of England	**2,650.8**	**2,650.8**	**0.0%**

Source: Census, Oxford Economics

Commuting

Description: The number of people that travel into, and out of, an area for work

Data: Local authorities: Constructed by Oxford Economics
Region: Constructed by Oxford Economics

Latest data: 2011

Net commuting flows in the EEFM are worked out by subtracting residence employment from total workplace employment (people). The net commuting flows for 2011 match those from the Census, as both the residence employment and the total workplace employment (people) series have already been scaled to the Census. Table 4.9 sets out the data.

Table 4.9: Comparison of net commuting flows from the Census with EEFM data, 2011

	Census net commuting, (000s, 2011)	EEFM data (000s, 2011)	Difference (%)
Babergh	-6.5	-6.5	0.0%
Basildon	-0.2	-0.2	0.0%
Bedford	-1.3	-1.3	0.0%
Braintree	-16.6	-16.6	0.0%
Breckland	-10.8	-10.8	0.0%
Brentwood	-2.4	-2.4	0.0%
Broadland	-14.3	-14.3	0.0%
Broxbourne	-7.4	-7.4	0.0%
Cambridge	34.8	34.8	0.0%
Castle Point	-16.1	-16.1	0.0%
Chelmsford	-3.8	-3.8	0.0%
Colchester	-1.9	-1.9	0.0%
Dacorum	-7.2	-7.2	0.0%
East Cambridgeshire	-12.8	-12.8	0.0%
East Hertfordshire	-14.0	-14.0	0.0%
Epping Forest	-14.0	-14.0	0.0%
Fenland	-6.4	-6.4	0.0%
Forest Heath	1.4	1.4	0.0%
Great Yarmouth	-1.3	-1.3	0.0%
Harlow	-0.6	-0.6	0.0%
Hertsmere	-3.1	-3.1	0.0%
Huntingdonshire	-11.6	-11.6	0.0%
Ipswich	6.1	6.1	0.0%
King's Lynn and West Norfolk	-3.8	-3.8	0.0%
Luton	0.8	0.8	0.0%
Maldon	-7.3	-7.3	0.0%
Mid Bedfordshire	-19.9	-19.9	0.0%
Mid Suffolk	-6.9	-6.9	0.0%
North Hertfordshire	-12.5	-12.5	0.0%
North Norfolk	-3.6	-3.6	0.0%
Norwich	26.8	26.8	0.0%
Peterborough	13.1	13.1	0.0%
Rochford	-14.0	-14.0	0.0%
South Bedfordshire	-14.0	-14.0	0.0%
South Cambridgeshire	-4.7	-4.7	0.0%
South Norfolk	-6.0	-6.0	0.0%
Southend-on-Sea	-9.3	-9.3	0.0%
St Albans	-9.8	-9.8	0.0%
St Edmundsbury	1.9	1.9	0.0%
Stevenage	2.1	2.1	0.0%
Suffolk Coastal	-3.9	-3.9	0.0%
Tendring	-10.5	-10.5	0.0%
Three Rivers	-8.6	-8.6	0.0%
Thurrock	-13.2	-13.2	0.0%
Uttlesford	-0.5	-0.5	0.0%
Watford	3.8	3.8	0.0%
Waveney	-4.2	-4.2	0.0%
Welwyn Hatfield	15.4	15.4	0.0%
East of England	**-198.7**	**-198.7**	**0.0%**

Source: Census, Oxford Economics

Demography

Population – total

Description: total population, all ages

Data: Local authorities: National Statistics, mid year population estimates
Region: National Statistics, mid year population estimates

Latest data: 2013
Next release: 2014, available summer 2015

ONS's population mid-year estimates are used directly in the EEFM so, as Table 4.10 shows, there is no difference between them and EEFM input data for most areas. Some areas have been adjusted to reflect US Air Force personnel.

Table 4.10: Comparison of population data with EEFM data, 2013

	Mid year estimates (000s, 2013)	EEFM data (000s, 2013)	Difference (%)
Babergh	88.3	88.3	0.0%
Basildon	178.4	178.3	0.0%
Bedford	161.4	161.4	0.0%
Braintree	149.1	149.1	0.0%
Breckland	132.6	133.0	0.3%
Brentwood	74.5	74.5	0.0%
Broadland	125.5	125.5	0.0%
Broxbourne	95.0	95.0	0.0%
Cambridge	126.5	126.7	0.1%
Castle Point	88.6	88.6	0.0%
Chelmsford	170.3	170.2	0.0%
Colchester	177.6	177.6	0.0%
Dacorum	148.2	148.2	0.0%
East Cambridgeshire	85.4	85.9	0.6%
East Hertfordshire	141.1	141.1	0.0%
Epping Forest	127.2	127.2	0.0%
Fenland	96.7	96.7	0.0%
Forest Heath	63.3	61.3	-3.2%
Great Yarmouth	97.8	97.8	0.0%
Harlow	83.4	83.4	0.0%
Hertsmere	101.3	101.3	0.0%
Huntingdonshire	172.1	172.0	0.0%
Ipswich	134.7	134.7	0.0%
King's Lynn and West Norfolk	148.8	149.2	0.3%
Luton	208.0	208.0	0.0%
Maldon	62.2	62.2	0.0%
Mid Bedfordshire	141.4	141.4	0.0%
Mid Suffolk	98.0	98.0	0.0%
North Hertfordshire	129.3	129.3	0.0%
North Norfolk	102.0	102.0	0.0%
Norwich	135.9	135.9	0.0%
Peterborough	188.4	188.3	0.0%
Rochford	83.9	83.9	0.0%
South Bedfordshire	123.1	123.1	0.0%
South Cambridgeshire	151.4	151.4	0.0%
South Norfolk	127.6	127.6	0.0%
Southend-on-Sea	175.8	175.8	0.0%
St Albans	143.1	143.1	0.0%
St Edmundsbury	111.3	111.8	0.4%
Stevenage	85.5	85.5	0.0%
Suffolk Coastal	124.4	124.4	0.0%
Tendring	138.7	138.7	0.0%
Three Rivers	89.5	89.5	0.0%
Thurrock	160.8	160.8	0.0%
Uttlesford	82.7	82.7	0.0%
Watford	93.7	93.7	0.0%
Waveney	116.0	115.9	0.0%
Welwyn Hatfield	114.1	114.0	0.0%
East of England	**5,954.2**	**5,953.5**	**0.0%**

Source: ONS, Oxford Economics

Working age population

Description: Prior to the EEFM 2013 update, working age population was defined as all people aged 16-retirement age. However, the ONS no longer publishes this series. Therefore, we have changed the definition of working age population to be defined as all people aged 16-64.

Data: Local authorities: National Statistics, mid year population estimates
Region: National Statistics, mid year population estimates

Latest data: 2013
Next release: 2014, available summer 2015

Similar to total population, working age population defined as all people aged 16-64 is used directly within the EEFM. As such, there are no differences between the published data and that used in the EEFM, with the exception of areas adjusted for US Air Force personnel. This is shown in table 4.11 below.

Table 4.11: Comparison of working age population data with EEFM data, 2013

	Mid year estimates (000s, 2013)	EEFM data (000s, 2013)	Difference (%)
Babergh	51.75	51.73	0.0%
Basildon	112.0	112.0	0.0%
Bedford	101.9	101.9	0.0%
Braintree	92.9	92.8	0.0%
Breckland	78.7	79.1	0.5%
Brentwood	45.9	45.9	0.0%
Broadland	74.6	74.6	0.0%
Broxbourne	59.5	59.5	0.0%
Cambridge	92.1	92.3	0.2%
Castle Point	52.9	52.9	0.0%
Chelmsford	107.7	107.7	0.0%
Colchester	114.7	114.7	0.0%
Dacorum	94.3	94.3	0.0%
East Cambridgeshire	52.6	53.1	0.9%
East Hertfordshire	89.8	89.8	0.0%
Epping Forest	79.2	79.2	0.0%
Fenland	59.0	59.0	0.0%
Forest Heath	40.6	38.5	-5.0%
Great Yarmouth	58.6	58.6	0.0%
Harlow	52.8	52.8	0.0%
Hertsmere	63.1	63.1	0.0%
Huntingdonshire	108.9	108.9	0.0%
Ipswich	87.2	87.1	0.0%
King's Lynn and West Norfolk	87.2	87.6	0.6%
Luton	134.7	134.7	0.0%
Maldon	37.6	37.6	0.0%
Mid Bedfordshire	90.3	90.3	0.0%
Mid Suffolk	58.9	58.9	0.0%
North Hertfordshire	80.9	80.9	0.0%
North Norfolk	56.4	56.4	0.0%
Norwich	93.0	92.9	0.0%
Peterborough	120.8	120.7	0.0%
Rochford	50.8	50.8	0.0%
South Bedfordshire	78.6	78.6	0.0%
South Cambridgeshire	94.1	94.1	0.0%
South Norfolk	75.2	75.1	0.0%
Southend-on-Sea	109.5	109.5	0.0%
St Albans	88.6	88.5	0.0%
St Edmundsbury	68.0	68.5	0.7%
Stevenage	55.3	55.3	0.0%
Suffolk Coastal	71.7	71.7	0.0%
Tendring	76.4	76.4	0.0%
Three Rivers	55.7	55.7	0.0%
Thurrock	103.8	103.8	0.0%
Uttlesford	50.8	50.8	0.0%
Watford	61.9	61.9	0.0%
Waveney	66.6	66.6	0.0%
Welwyn Hatfield	75.1	75.0	0.0%
East of England	**3,712.5**	**3,711.8**	**0.0%**

Source: ONS, Oxford Economics

Young population

Description: population aged 0-15

Data:	Local authorities:	National Statistics, mid year population estimates
	Region:	National Statistics, mid year population estimates

Latest data: 2013

Next release: 2014, available summer 2015

Notes: In the Spring 2010 run, the EEFM definition of working age was changed to exclude 15 year-olds.

Young population for the East region in the Model is estimated as the residual between total population, working age population and elderly population. As such, data for young population used in the Model matches up directly with the published source.

Note: the reason that we estimate young population as a residual rather than use the data directly is to allow for the forecasting of these variables, and also to ensure that the identities still hold true (i.e. that total population will be equal to the sum of young, working age and elderly population).

Elderly population

Description: Prior to the EEFM 2013 update, elderly population data was defined as male population aged 65+ plus female population aged retirement age+. However since the EEFM 2013 update, the definition of working age population was changed since ONS no longer publishes the number of people aged 16 to retirement age. Therefore, elderly population is defined as all people aged 65+.

Data:	Local authorities:	National Statistics, mid year population estimates
	Region:	National Statistics, mid year population estimates

Latest data: 2013

Next release: 2014, available summer 2015

Similar to the young and working age population, the elderly population is used directly from the published source. Therefore there are no differences between the final EEFM estimates and the published data.

Net migration and other changes

Description: net migration flows to/from an area, including other changes (e.g. boundary adjustments, prisoner movements, boarding school pupils, etc.)

Data:	Local authorities:	National Statistics, components of change
	Region:	National Statistics, components of change

Latest data: 2013

Next release: 2014, available summer 2015

The net migration figures used in the EEFM are based initially on ONS population mid-year estimates 'components of change' data, specifically the category 'net migration and other changes.' But these are then

scaled upwards to the regional net migration data for the East of England used in the Oxford Regional Model, which are sourced from *Population Trends* and differ slightly from the 'components of change' data due to minor methodological differences. Table 4.12 shows that the difference regionally between the 'components of change' series and the data actually used in the EEFM is only 1,480 migrants in 2013. (The scaling process allocates these to local authorities in accordance with their share of the region's total population.)

Table 4.12: Comparison of 'net migration and other changes' data with EEFM data, 2013

	Net migration and other changes (000s, 2013)	EEFM data (000s, 2013)	Difference (000s)
Babergh	0.50	0.52	0.02
Basildon	1.00	1.04	0.04
Bedford	1.40	1.44	0.04
Braintree	0.40	0.43	0.03
Breckland	0.70	1.13	0.43
Brentwood	0.30	0.32	0.02
Broadland	0.60	0.63	0.03
Broxbourne	0.00	0.02	0.02
Cambridge	0.80	1.03	0.23
Castle Point	0.50	0.52	0.02
Chelmsford	0.40	0.44	0.04
Colchester	0.80	0.84	0.04
Dacorum	0.90	0.93	0.03
East Cambridgeshire	-0.20	0.32	0.52
East Hertfordshire	1.20	1.23	0.03
Epping Forest	0.60	0.63	0.03
Fenland	0.60	0.62	0.02
Forest Heath	2.00	0.01	-1.99
Great Yarmouth	0.30	0.32	0.02
Harlow	0.00	0.02	0.02
Hertsmere	0.20	0.22	0.02
Huntingdonshire	0.30	0.34	0.04
Ipswich	-0.60	-0.57	0.03
King's Lynn and West Norfolk	0.10	0.63	0.53
Luton	0.10	0.15	0.05
Maldon	0.30	0.31	0.01
Mid Bedfordshire	1.76	1.80	0.03
Mid Suffolk	0.40	0.42	0.02
North Hertfordshire	0.50	0.53	0.03
North Norfolk	0.90	0.92	0.02
Norwich	0.80	0.83	0.03
Peterborough	0.20	0.24	0.04
Rochford	0.10	0.12	0.02
South Bedfordshire	1.54	1.56	0.03
South Cambridgeshire	-0.30	-0.26	0.04
South Norfolk	1.50	1.53	0.03
Southend-on-Sea	0.50	0.54	0.04
St Albans	0.40	0.43	0.03
St Edmundsbury	-0.50	0.03	0.53
Stevenage	0.20	0.22	0.02
Suffolk Coastal	0.50	0.53	0.03
Tendring	1.20	1.23	0.03
Three Rivers	0.50	0.52	0.02
Thurrock	0.10	0.14	0.04
Uttlesford	1.20	1.22	0.02
Watford	1.20	1.22	0.02
Waveney	0.50	0.53	0.03
Welwyn Hatfield	1.60	1.63	0.03
East of England	**28.00**	**29.48**	**1.48**

Source: ONS, Oxford Economics

Natural increase

Description: the numbers of births minus deaths

Data: Local authorities: National Statistics, components of change
Region: National Statistics, components of change

Latest data: 2013

Next release: 2014, available summer 2015

The natural increase data used in the EEFM is the residual of the total population in the current year (see above) once total population in the previous year and net migration over the year have both been subtracted. This formula implies that since the net migration data in the EEFM is *higher* than ONS's "components of change" estimate of net migration (Table 4.12 above), the natural increase data in the EEFM should be *lower* than the "components of change" figure. Table 4.13 shows that this is indeed the case, although the size of the difference is not exactly the same.

Table 4.13: Comparison of natural increase data with EEFM data, 2013

	Natural increase, (000s, 2013)	EEFM data (000s, 2013)	Difference (000s)
Babergh	-0.10	-0.15	-0.05
Basildon	0.90	0.85	-0.05
Bedford	0.70	0.74	0.04
Braintree	0.40	0.29	-0.11
Breckland	0.00	0.00	0.00
Brentwood	0.10	0.12	0.02
Broadland	-0.30	-0.35	-0.05
Broxbourne	0.50	0.47	-0.03
Cambridge	0.50	0.49	-0.01
Castle Point	-0.20	-0.17	0.03
Chelmsford	0.50	0.48	-0.02
Colchester	0.90	0.78	-0.12
Dacorum	0.60	0.53	-0.07
East Cambridgeshire	0.50	0.48	-0.02
East Hertfordshire	0.50	0.38	-0.12
Epping Forest	0.40	0.46	0.06
Fenland	0.20	0.11	-0.09
Forest Heath	0.50	0.51	0.01
Great Yarmouth	-0.10	-0.10	0.00
Harlow	0.70	0.68	-0.02
Hertsmere	0.40	0.34	-0.06
Huntingdonshire	0.70	0.69	-0.01
Ipswich	0.80	0.79	-0.01
King's Lynn and West Norfolk	0.00	-0.01	-0.01
Luton	2.00	2.00	0.00
Maldon	0.00	-0.07	-0.07
Mid Bedfordshire	0.70	0.64	-0.06
Mid Suffolk	0.00	-0.06	-0.06
North Hertfordshire	0.40	0.36	-0.04
North Norfolk	-0.60	-0.67	-0.07
Norwich	0.80	0.80	0.00
Peterborough	1.80	1.76	-0.04
Rochford	0.00	-0.08	-0.08
South Bedfordshire	0.60	0.56	-0.05
South Cambridgeshire	0.70	0.63	-0.07
South Norfolk	0.10	0.06	-0.04
Southend-on-Sea	0.50	0.42	-0.08
St Albans	0.80	0.76	-0.04
St Edmundsbury	0.20	0.18	-0.02
Stevenage	0.50	0.46	-0.04
Suffolk Coastal	-0.40	-0.45	-0.05
Tendring	-0.80	-0.80	0.00
Three Rivers	0.20	0.17	-0.03
Thurrock	1.20	1.18	-0.02
Uttlesford	0.30	0.21	-0.09
Watford	0.80	0.78	-0.02
Waveney	-0.20	-0.24	-0.04
Welwyn Hatfield	0.50	0.39	-0.11
East of England	**19.20**	**17.39**	**-1.81**

Source: ONS, Oxford Economics

Output

GVA

Description: Gross Value Added in real 2010 prices
(Note: GVA data were rebased in the EEFM 2014 run of the Model so that the figures presented in the EEFM were consistent with the Blue Book.)

Data: Local authorities: Constructed by Oxford Economics, Regional Accounts
Region: National Statistics, Regional Accounts

Latest data: Regional data: 2012 totals and sector data
Local authority data: 2011 totals and sector data

Next release: Regional data: 2013 totals and sector data available December 2014
Local authority data: 2012 totals and sector data available December 2014

Regional GVA data by 19 sectors is taken from "Regional Accounts." (These are scaled to match the UK National Accounts, as published in the "Blue Book." Volume indices by sector are taken from the Blue Book to convert the GVA data into real 2010 prices.)

Local authority GVA forecasts are obtained by multiplying forecast regional GVA per job (productivity) in a sector (which comes from the Regional Model) by forecast total workplace employment (jobs) in that sector (from the EEFM) for each local authority. As described earlier, these are then subject to wage differential adjustments and scaling to the NUTS 3 level data published in Regional Accounts. Scaling operations rarely achieve total precision, but as Table 4.14 shows, the differences between the Regional Accounts NUTS 3 data and those used in the EEFM are very small. (Note: the data are presented for 2010 which, as it is the base year, is the only year in which nominal and real GVA will be equal.)

Table 4.14: Comparison of GVA data with EEFM data, 2010 (£m)

	Regional Accounts GVA (£m, 2010)	EEFM GVA (£m, 2010)	Difference (%)
Peterborough	4,242	4,253	0.2%
Cambridgeshire CC	13,788	13,742	-0.3%
Norfolk	14,030	14,066	0.3%
Suffolk	12,820	12,845	0.2%
Luton	4,109	4,093	-0.4%
Bedfordshire CC	6,868	6,876	0.1%
Hertfordshire	26,512	26,474	-0.1%
Southend-on-Sea	2,670	2,672	0.1%
Thurrock	2,470	2,477	0.3%
Essex CC	24,642	24,659	0.1%

Source: Regional Accounts, Oxford Economics

Housing

Demand for dwellings

Description: Stock of dwellings.

Data: Local authorities: DCLG – dwelling stock estimates

Latest data: 2013
Next release: 2014, data due in 2015

The source of data for dwelling stock changed in the EEFM 2013 update. Previously, we took data from the Housing Strategy Statistical Appendix, however this no longer includes estimates of private dwelling stock. Therefore, based on recommendations by DCLG, dwelling stock data are sourced from table 125 which provides estimates of total dwelling stock, and table 615 which provides estimates of vacant dwelling stock. The difference between these two series is therefore occupied dwelling stock.

DCLG data on the stock of dwellings by local authority is used directly in the EEFM, so the two series match exactly, as shown in Table 4.15. The forecast variable "demand for dwellings" seeks to accommodate forecast new households *using Oxford Economics occupancy rate assumptions*.

Table 4.15: Comparison of DCLG dwelling stock data with EEFM data, 2013

	DCLG data (000s, 2013)	EEFM data (000s, 2013)	Difference (%)
Babergh	39.5	39.5	0.0%
Basildon	75.3	75.3	0.0%
Bedford	68.9	68.9	0.0%
Braintree	63.2	63.2	0.0%
Breckland	58.1	58.1	0.0%
Brentwood	32.4	32.4	0.0%
Broadland	55.3	55.3	0.0%
Broxbourne	39.6	39.6	0.0%
Cambridge	49.1	49.1	0.0%
Castle Point	37.9	37.9	0.0%
Chelmsford	71.7	71.7	0.0%
Colchester	76.2	76.2	0.0%
Dacorum	62.6	62.6	0.0%
East Cambridgeshire	36.4	36.4	0.0%
East Hertfordshire	59.4	59.4	0.0%
Epping Forest	54.8	54.8	0.0%
Fenland	42.6	42.6	0.0%
Forest Heath	28.2	28.2	0.0%
Great Yarmouth	44.7	44.7	0.0%
Harlow	36.3	36.3	0.0%
Hertsmere	41.5	41.5	0.0%
Huntingdonshire	72.7	72.7	0.0%
Ipswich	59.7	59.7	0.0%
King's Lynn and West Norfolk	74.9	74.9	0.0%
Luton	76.7	76.7	0.0%
Maldon	27.4	27.4	0.0%
Mid Bedfordshire	58.1	58.1	0.0%
Mid Suffolk	42.6	42.6	0.0%
North Hertfordshire	55.7	55.7	0.0%
North Norfolk	53.8	53.8	0.0%
Norwich	64.0	64.0	0.0%
Peterborough	78.3	78.3	0.0%
Rochford	34.6	34.6	0.0%
South Bedfordshire	52.8	52.8	0.0%
South Cambridgeshire	63.0	63.0	0.0%
South Norfolk	56.0	56.0	0.0%
Southend-on-Sea	79.2	79.2	0.0%
St Albans	58.6	58.6	0.0%
St Edmundsbury	47.5	47.5	0.0%
Stevenage	35.8	35.8	0.0%
Suffolk Coastal	58.9	58.9	0.0%
Tendring	67.4	67.4	0.0%
Three Rivers	36.5	36.5	0.0%
Thurrock	64.5	64.5	0.0%
Uttlesford	33.9	33.9	0.0%
Watford	38.4	38.4	0.0%
Waveney	54.9	54.9	0.0%
Welwyn Hatfield	46.0	46.0	0.0%
East of England	**2,565.6**	**2,565.6**	**0.0%**

Source: DCLG, Oxford Economics

House prices

Description: House prices

Data: Local authorities: DCLG – Land Registry house prices, table 585
Region: DCLG – Mix-adjusted house prices, table 593

Latest data: 2013
Next release: 2014, available 2015

Data on house prices by local authority is taken from DCLG and incorporated into the EEFM, so of course the two series match exactly, as shown in Table 4.16. There is scope to do simple house price forecasts in the EEFM on the basis of these, though this has so far not been used.

Table 4.16: Comparison of DCLG house prices data with EEFM data, 2013

	DCLG data (£000s, 2013)	EEFM data (£000s, 2013)	Difference (%)
Babergh	242.0	242.0	0.0%
Basildon	226.8	226.8	0.0%
Bedford	218.0	218.0	0.0%
Braintree	223.8	223.8	0.0%
Breckland	180.7	180.7	0.0%
Brentwood	346.8	346.8	0.0%
Broadland	199.8	199.8	0.0%
Broxbourne	253.9	253.9	0.0%
Cambridge	333.5	333.5	0.0%
Castle Point	214.2	214.2	0.0%
Chelmsford	270.3	270.3	0.0%
Colchester	211.4	211.4	0.0%
Dacorum	325.9	325.9	0.0%
East Cambridgeshire	214.5	214.5	0.0%
East Hertfordshire	317.0	317.0	0.0%
Epping Forest	359.5	359.5	0.0%
Fenland	151.6	151.6	0.0%
Forest Heath	180.1	180.1	0.0%
Great Yarmouth	155.2	155.2	0.0%
Harlow	196.3	196.3	0.0%
Hertsmere	393.9	393.9	0.0%
Huntingdonshire	210.9	210.9	0.0%
Ipswich	164.1	164.1	0.0%
King's Lynn and West Norfolk	180.2	180.2	0.0%
Luton	167.6	167.6	0.0%
Maldon	243.3	243.3	0.0%
Mid Bedfordshire	248.9	248.9	0.0%
Mid Suffolk	210.8	210.8	0.0%
North Hertfordshire	273.8	273.8	0.0%
North Norfolk	206.0	206.0	0.0%
Norwich	175.6	175.6	0.0%
Peterborough	161.1	161.1	0.0%
Rochford	242.8	242.8	0.0%
South Bedfordshire	216.6	216.6	0.0%
South Cambridgeshire	289.9	289.9	0.0%
South Norfolk	210.5	210.5	0.0%
Southend-on-Sea	221.1	221.1	0.0%
St Albans	439.6	439.6	0.0%
St Edmundsbury	218.0	218.0	0.0%
Stevenage	194.6	194.6	0.0%
Suffolk Coastal	250.4	250.4	0.0%
Tendring	176.7	176.7	0.0%
Three Rivers	415.1	415.1	0.0%
Thurrock	187.0	187.0	0.0%
Uttlesford	341.7	341.7	0.0%
Watford	268.0	268.0	0.0%
Waveney	180.4	180.4	0.0%
Welwyn Hatfield	315.3	315.3	0.0%
East of England	**242.5**	**242.5**	**0.0%**

Source: DCLG, Oxford Economics

Number of households

Description: Households

Data: Estimated by Oxford Economics

Latest data: 2013
Next release: 2014, data due in 2015

Table 4.17 shows the difference between the most recent DCLG household estimates by local authority, and the household data used in EEFM. At regional level, the series only differ by 0.1%, although the differences can be somewhat greater for individual local authorities.

Table 4.17: Comparison of DCLG household estimates with EEFM data, 2013

	DCLG data (000s, 2013)	EEFM data (000s, 2013)	Difference (%)
Babergh	38.1	38.2	0.2%
Basildon	74.1	73.6	-0.6%
Bedford	65.7	67.0	2.0%
Braintree	62.7	61.6	-1.9%
Breckland	56.1	56.0	-0.2%
Brentwood	31.3	31.4	0.1%
Broadland	54.2	53.8	-0.8%
Broxbourne	38.2	38.5	0.6%
Cambridge	45.9	48.2	5.0%
Castle Point	37.0	37.3	0.9%
Chelmsford	71.0	70.2	-1.0%
Colchester	74.4	74.3	-0.1%
Dacorum	61.0	61.4	0.7%
East Cambridgeshire	36.5	35.5	-2.7%
East Hertfordshire	58.3	58.1	-0.4%
Epping Forest	53.2	53.5	0.7%
Fenland	42.1	41.3	-2.0%
Forest Heath	26.1	26.7	2.5%
Great Yarmouth	43.1	42.8	-0.6%
Harlow	35.3	35.6	0.9%
Hertsmere	40.9	40.6	-0.9%
Huntingdonshire	71.1	70.5	-0.9%
Ipswich	58.5	57.6	-1.6%
King's Lynn and West Norfolk	64.3	69.1	7.4%
Luton	76.5	75.3	-1.6%
Maldon	26.3	26.3	0.0%
Mid Bedfordshire	58.3	56.5	-3.1%
Mid Suffolk	41.6	41.0	-1.3%
North Hertfordshire	54.8	54.5	-0.6%
North Norfolk	47.0	48.4	2.9%
Norwich	61.6	61.3	-0.5%
Peterborough	76.4	74.9	-1.9%
Rochford	34.2	33.8	-1.2%
South Bedfordshire	49.9	51.5	3.1%
South Cambridgeshire	62.6	61.4	-1.9%
South Norfolk	54.2	53.9	-0.5%
Southend-on-Sea	75.9	76.1	0.2%
St Albans	57.3	57.4	0.3%
St Edmundsbury	46.7	45.7	-2.0%
Stevenage	35.4	35.3	-0.2%
Suffolk Coastal	55.1	54.8	-0.4%
Tendring	64.0	64.0	-0.1%
Three Rivers	36.3	35.8	-1.5%
Thurrock	64.4	63.5	-1.3%
Uttlesford	32.5	32.7	0.8%
Watford	37.2	37.4	0.6%
Waveney	51.7	51.6	-0.2%
Welwyn Hatfield	45.6	45.0	-1.2%
East of England	**2,484.6**	**2,480.9**	**-0.1%**

Source: DCLG, Oxford Economics

Carbon emissions

Industry, commercial & energy emissions

Description: CO2 emissions from the industry, commercial & energy sectors

Data: Local authorities: DECC – Full local CO2 emissions estimates

Latest data: 2012
Next release: 2013, data due in 2015

DECC data on the CO2 emissions from the industry, commercial & energy sectors by local authority is used directly in the EEFM, so the two series match exactly, as shown in Table 4.18.

Table 4.18: Comparison of DECC CO2 industry, commercial & energy emissions with EEFM data, 2012

	DECC data (k tonnes 2012)	EEFM data (k tonnes, 2012)	Difference (%)
Babergh	209.4	209.4	0.0%
Basildon	374.2	374.2	0.0%
Bedford	329.1	329.1	0.0%
Braintree	286.3	286.3	0.0%
Breckland	287.1	287.1	0.0%
Brentwood	128.8	128.8	0.0%
Broadland	392.3	392.3	0.0%
Broxbourne	182.7	182.7	0.0%
Cambridge	436.8	436.8	0.0%
Castle Point	76.3	76.3	0.0%
Chelmsford	348.1	348.1	0.0%
Colchester	310.3	310.3	0.0%
Dacorum	238.1	238.1	0.0%
East Cambridgeshire	193.8	193.8	0.0%
East Hertfordshire	260.9	260.9	0.0%
Epping Forest	212.8	212.8	0.0%
Fenland	459.2	459.2	0.0%
Forest Heath	193.4	193.4	0.0%
Great Yarmouth	154.3	154.3	0.0%
Harlow	286.1	286.1	0.0%
Hertsmere	220.5	220.5	0.0%
Huntingdonshire	453.6	453.6	0.0%
Ipswich	227.2	227.2	0.0%
King's Lynn and West Norfolk	1,033.8	1,033.8	0.0%
Luton	337.0	337.0	0.0%
Maldon	116.1	116.1	0.0%
Mid Bedfordshire	230.9	230.9	0.0%
Mid Suffolk	237.6	237.6	0.0%
North Hertfordshire	265.6	265.6	0.0%
North Norfolk	256.6	256.6	0.0%
Norwich	344.2	344.2	0.0%
Peterborough	467.9	467.9	0.0%
Rochford	107.7	107.7	0.0%
South Bedfordshire	208.3	208.3	0.0%
South Cambridgeshire	475.7	475.7	0.0%
South Norfolk	294.9	294.9	0.0%
Southend-on-Sea	247.5	247.5	0.0%
St Albans	202.8	202.8	0.0%
St Edmundsbury	835.2	835.2	0.0%
Stevenage	222.6	222.6	0.0%
Suffolk Coastal	256.8	256.8	0.0%
Tendring	206.5	206.5	0.0%
Three Rivers	129.5	129.5	0.0%
Thurrock	612.2	612.2	0.0%
Uttlesford	188.2	188.2	0.0%
Watford	232.0	232.0	0.0%
Waveney	288.1	288.1	0.0%
Welwyn Hatfield	315.8	315.8	0.0%
East of England	**14,374.7**	**14,374.7**	**0.0%**

Source: DECC, Oxford Economics

Domestic emissions

Description: CO2 emissions from the domestic sector

Data: Local authorities: DECC – Full local CO2 emissions estimates

Latest data: 2012
Next release: 2013, data due in 2015

DECC data on the CO2 emissions from the domestic sector by local authority is used directly in the EEFM, so the two series match exactly, as shown in Table 4.19.

Table 4.19: Comparison of DECC CO2 domestic emissions with EEFM data, 2012

	DECC data (k tonnes, 2012)	EEFM data (k tonnes, 2012)	Difference (%)
Babergh	212.8	212.8	0.0%
Basildon	372.0	372.0	0.0%
Bedford	344.1	344.1	0.0%
Braintree	325.8	325.8	0.0%
Breckland	303.6	303.6	0.0%
Brentwood	191.5	191.5	0.0%
Broadland	290.2	290.2	0.0%
Broxbourne	201.0	201.0	0.0%
Cambridge	231.4	231.4	0.0%
Castle Point	206.2	206.2	0.0%
Chelmsford	382.0	382.0	0.0%
Colchester	374.9	374.9	0.0%
Dacorum	333.3	333.3	0.0%
East Cambridgeshire	193.9	193.9	0.0%
East Hertfordshire	333.6	333.6	0.0%
Epping Forest	320.6	320.6	0.0%
Fenland	220.1	220.1	0.0%
Forest Heath	143.8	143.8	0.0%
Great Yarmouth	210.2	210.2	0.0%
Harlow	161.8	161.8	0.0%
Hertsmere	242.1	242.1	0.0%
Huntingdonshire	377.5	377.5	0.0%
Ipswich	259.2	259.2	0.0%
King's Lynn and West Norfolk	377.7	377.7	0.0%
Luton	378.1	378.1	0.0%
Maldon	152.2	152.2	0.0%
Mid Bedfordshire	300.5	300.5	0.0%
Mid Suffolk	230.3	230.3	0.0%
North Hertfordshire	291.6	291.6	0.0%
North Norfolk	277.5	277.5	0.0%
Norwich	261.2	261.2	0.0%
Peterborough	370.2	370.2	0.0%
Rochford	193.7	193.7	0.0%
South Bedfordshire	274.4	274.4	0.0%
South Cambridgeshire	352.1	352.1	0.0%
South Norfolk	302.2	302.2	0.0%
Southend-on-Sea	397.6	397.6	0.0%
St Albans	339.9	339.9	0.0%
St Edmundsbury	238.8	238.8	0.0%
Stevenage	162.2	162.2	0.0%
Suffolk Coastal	306.7	306.7	0.0%
Tendring	325.6	325.6	0.0%
Three Rivers	222.0	222.0	0.0%
Thurrock	311.5	311.5	0.0%
Uttlesford	202.7	202.7	0.0%
Watford	188.4	188.4	0.0%
Waveney	257.3	257.3	0.0%
Welwyn Hatfield	239.5	239.5	0.0%
East of England	**13,185.7**	**13,185.7**	**0.0%**

Source: DECC, Oxford Economics

Transport emissions

Description: CO2 emissions from the transport sector

Data: Local authorities: DECC – Full local CO2 emissions estimates

Latest data: 2012
Next release: 2013, data due in 2015

DECC data on the CO2 emissions from the transport sector by local authority is used directly in the EEFM, so the two series match exactly, as shown in Table 4.20.

Table 4.20: Comparison of DECC CO2 transport emissions with EEFM data, 2012

	DECC data (k tonnes, 2012)	EEFM data (k tonnes, 2012)	Difference (%)
Babergh	229.8	229.8	0.0%
Basildon	275.4	275.4	0.0%
Bedford	313.5	313.5	0.0%
Braintree	342.9	342.9	0.0%
Breckland	380.8	380.8	0.0%
Brentwood	264.9	264.9	0.0%
Broadland	238.5	238.5	0.0%
Broxbourne	118.1	118.1	0.0%
Cambridge	107.3	107.3	0.0%
Castle Point	105.6	105.6	0.0%
Chelmsford	367.4	367.4	0.0%
Colchester	338.2	338.2	0.0%
Dacorum	266.9	266.9	0.0%
East Cambridgeshire	258.2	258.2	0.0%
East Hertfordshire	271.6	271.6	0.0%
Epping Forest	592.7	592.7	0.0%
Fenland	188.6	188.6	0.0%
Forest Heath	183.5	183.5	0.0%
Great Yarmouth	137.2	137.2	0.0%
Harlow	97.3	97.3	0.0%
Hertsmere	363.9	363.9	0.0%
Huntingdonshire	709.5	709.5	0.0%
Ipswich	113.4	113.4	0.0%
King's Lynn and West Norfolk	397.3	397.3	0.0%
Luton	206.1	206.1	0.0%
Maldon	78.5	78.5	0.0%
Mid Bedfordshire	410.9	410.9	0.0%
Mid Suffolk	273.9	273.9	0.0%
North Hertfordshire	278.2	278.2	0.0%
North Norfolk	221.4	221.4	0.0%
Norwich	139.4	139.4	0.0%
Peterborough	411.3	411.3	0.0%
Rochford	98.4	98.4	0.0%
South Bedfordshire	319.5	319.5	0.0%
South Cambridgeshire	586.6	586.6	0.0%
South Norfolk	396.2	396.2	0.0%
Southend-on-Sea	162.0	162.0	0.0%
St Albans	486.8	486.8	0.0%
St Edmundsbury	252.5	252.5	0.0%
Stevenage	128.5	128.5	0.0%
Suffolk Coastal	260.6	260.6	0.0%
Tendring	234.9	234.9	0.0%
Three Rivers	321.3	321.3	0.0%
Thurrock	410.8	410.8	0.0%
Uttlesford	463.6	463.6	0.0%
Watford	96.8	96.8	0.0%
Waveney	152.5	152.5	0.0%
Welwyn Hatfield	268.9	268.9	0.0%
East of England	**13,321.8**	**13,321.8**	**0.0%**

Source: DECC, Oxford Economics

LULUCF emissions

Description: CO2 emissions from the land use, land use change and forestry (LULUCF) sector

Data: Local authorities: DECC – Full local CO2 emissions estimates

Latest data: 2012
Next release: 2013, data due in 2015

DECC data on the CO2 emissions from the LULUCF sector by local authority is used directly in the EEFM, so the two series match exactly, as shown in Table 4.21.

Table 4.21: Comparison of DECC CO2 LULUCF emissions with EEFM data, 2012

	DECC data (k tonnes, 2012)	EEFM data (k tonnes, 2012)	Difference (%)
Babergh	5.9	5.9	0.0%
Basildon	1.7	1.7	0.0%
Bedford	5.6	5.6	0.0%
Braintree	5.8	5.8	0.0%
Breckland	-169.9	-169.9	0.0%
Brentwood	2.5	2.5	0.0%
Broadland	8.1	8.1	0.0%
Broxbourne	0.8	0.8	0.0%
Cambridge	0.3	0.3	0.0%
Castle Point	0.7	0.7	0.0%
Chelmsford	4.2	4.2	0.0%
Colchester	4.1	4.1	0.0%
Dacorum	2.3	2.3	0.0%
East Cambridgeshire	142.2	142.2	0.0%
East Hertfordshire	5.8	5.8	0.0%
Epping Forest	4.4	4.4	0.0%
Fenland	142.3	142.3	0.0%
Forest Heath	-7.4	-7.4	0.0%
Great Yarmouth	3.3	3.3	0.0%
Harlow	0.3	0.3	0.0%
Hertsmere	2.2	2.2	0.0%
Huntingdonshire	117.4	117.4	0.0%
Ipswich	0.1	0.1	0.0%
King's Lynn and West Norfolk	70.2	70.2	0.0%
Luton	0.7	0.7	0.0%
Maldon	5.7	5.7	0.0%
Mid Bedfordshire	7.2	7.2	0.0%
Mid Suffolk	-1.8	-1.8	0.0%
North Hertfordshire	5.0	5.0	0.0%
North Norfolk	12.3	12.3	0.0%
Norwich	0.7	0.7	0.0%
Peterborough	0.9	0.9	0.0%
Rochford	3.3	3.3	0.0%
South Bedfordshire	2.4	2.4	0.0%
South Cambridgeshire	21.4	21.4	0.0%
South Norfolk	10.4	10.4	0.0%
Southend-on-Sea	0.8	0.8	0.0%
St Albans	3.3	3.3	0.0%
St Edmundsbury	-32.3	-32.3	0.0%
Stevenage	0.3	0.3	0.0%
Suffolk Coastal	-102.7	-102.7	0.0%
Tendring	5.2	5.2	0.0%
Three Rivers	1.7	1.7	0.0%
Thurrock	3.0	3.0	0.0%
Uttlesford	5.9	5.9	0.0%
Watford	0.4	0.4	0.0%
Waveney	2.8	2.8	0.0%
Welwyn Hatfield	2.0	2.0	0.0%
East of England	**311.7**	**311.7**	**0.0%**

Source: DECC, Oxford Economics

Total emissions

Description: Total CO2 emissions

Data: Local authorities: DECC – Full local CO2 emissions estimates

Latest data: 2012
Next release: 2013, data due in 2015

DECC data on the total CO2 emissions by local authority is used directly in the EEFM, so the two series match exactly, as shown in Table 4.22.

Table 4.22: Comparison of DECC total CO2 emissions with EEFM data, 2012

	DECC data (k tonnes, 2012)	EEFM data (k tonnes, 2012)	Difference (%)
Babergh	657.8	657.8	0.0%
Basildon	1,023.3	1,023.3	0.0%
Bedford	992.3	992.3	0.0%
Braintree	960.8	960.8	0.0%
Breckland	801.5	801.5	0.0%
Brentwood	587.6	587.6	0.0%
Broadland	929.1	929.1	0.0%
Broxbourne	502.6	502.6	0.0%
Cambridge	775.8	775.8	0.0%
Castle Point	388.8	388.8	0.0%
Chelmsford	1,101.6	1,101.6	0.0%
Colchester	1,027.5	1,027.5	0.0%
Dacorum	840.6	840.6	0.0%
East Cambridgeshire	788.2	788.2	0.0%
East Hertfordshire	872.0	872.0	0.0%
Epping Forest	1,130.5	1,130.5	0.0%
Fenland	1,010.2	1,010.2	0.0%
Forest Heath	513.2	513.2	0.0%
Great Yarmouth	505.0	505.0	0.0%
Harlow	545.5	545.5	0.0%
Hertsmere	828.7	828.7	0.0%
Huntingdonshire	1,658.1	1,658.1	0.0%
Ipswich	599.9	599.9	0.0%
King's Lynn and West Norfolk	1,879.0	1,879.0	0.0%
Luton	922.0	922.0	0.0%
Maldon	352.6	352.6	0.0%
Mid Bedfordshire	949.5	949.5	0.0%
Mid Suffolk	740.0	740.0	0.0%
North Hertfordshire	840.4	840.4	0.0%
North Norfolk	767.7	767.7	0.0%
Norwich	745.5	745.5	0.0%
Peterborough	1,250.3	1,250.3	0.0%
Rochford	403.1	403.1	0.0%
South Bedfordshire	804.7	804.7	0.0%
South Cambridgeshire	1,435.7	1,435.7	0.0%
South Norfolk	1,003.7	1,003.7	0.0%
Southend-on-Sea	807.9	807.9	0.0%
St Albans	1,032.7	1,032.7	0.0%
St Edmundsbury	1,294.2	1,294.2	0.0%
Stevenage	513.6	513.6	0.0%
Suffolk Coastal	721.4	721.4	0.0%
Tendring	772.2	772.2	0.0%
Three Rivers	674.4	674.4	0.0%
Thurrock	1,337.6	1,337.6	0.0%
Uttlesford	860.4	860.4	0.0%
Watford	517.7	517.7	0.0%
Waveney	700.9	700.9	0.0%
Welwyn Hatfield	826.1	826.1	0.0%
East of England	**41,193.9**	**41,193.9**	**0.0%**

Source: DECC, Oxford Economics

5: Outliers and data validity

Oxford Economics adheres to the principle of incorporating published data unchanged into the EEFM as the crucial starting point upon which local economic data are founded. Data is then adjusted to be consistent with key regional and national series which offer more timely information around recent economic trends (see section 4 for further detail). This process allows Model users to reference key variables at the published source, however as data are adjusted this means that users cannot reference data directly, although the broad levels will remain consistent with the published source. Tables published in section 4 are provided to give a sense of the level of adjustment made to the published data.

However, in some cases the data can be anomalous - so-called "outliers." This could be because of errors in measuring or recording it. Or perhaps the data is "true" but reflects an unusual circumstance and so does not accurately represent the local situation or local trends. Because of the smaller numbers of observations, data-reporting errors or unusual "outlier" values can be a particular problem at more detailed levels of analysis - for example, when looking at individual sectors in individual local authorities.

This section explores these issues in respect of the BRES (note: prior to 2008, ABI data is used and subject to similar levels of volatility), and outlines Oxford Economics' approach to BRES data outliers. In summary, this is to keep them unchanged within the EEFM spreadsheets, but to adjust them when making forecasts such that the first year of a forecast would incorporate a correction for an outlier value in the BRES data in a previous year.

BRES outliers

The latest published BRES data is for 2012 and was released in September 2013. Since BRES data is collected by survey whereby individuals / firms complete the questionnaires, there can sometimes be significant discontinuities in the sector data at local level from year to year. Such discontinuities may - or may not - reflect real events. Consider the effects on the data series of an incomplete return from a firm - or an error interpreting or recording it - in one year preceded (or followed) by a complete or correct return in the previous (or subsequent) year. Any recorded change in employees associated with this would be fictitious, and any trend extrapolated from it into the future would be misleading. But equally, a dramatic change could reflect the opening, expansion, contraction or closure of a major business in an area (with potential longer-term effects on other local businesses).

If a discontinuity occurred in say 2008, but was corrected in 2009, producing a "spike" in the time-series data, it can essentially be ignored as it will not affect the forecasting process. Equally, if it were confirmed the following year, it would suggest a 'real' change in the local economy has indeed taken place. In the meantime, local authorities' input is vital to identify whether discontinuities in the data reflect 'real' events or not.

Focussing on the 2 digit SIC 2007 sectors for employee jobs at local authority level, we identified discontinuities showing **more than a 10% change in number of employees in a single year where this change involved more than 1,000 employees**. These outliers were sent to appropriate local authority representatives for their reaction and input.

Oxford Economics' response to this consultation was as follows: where we were satisfied that a discontinuity genuinely reflected the opening or closure of a firm, or major expansion or contraction, we accepted the change as the correct starting point for the EEFM forecasts. But if we were given evidence by the steering group that there was an error in the BRES data or that an outlier gave a misleading picture of the local

situation in some way, we corrected for the discontinuity in the first year of the forecast. (In the absence of any information about a discontinuity, we accepted it, in line with our working principle outlined above.)

In addition, Oxford Economics made further adjustments to LQs in 2013 where data 'spikes' occurred in 2012 which fell outside of the criteria used in the validation exercise, and were deemed implausible.

Table 5.1 sets out those local authorities and sectors where adjustments were made to 2012 BRES data, showing the size and direction of the correction. Areas formatted in italics are those which were identified in the data validation process carried out with local authorities, and areas formatted in non-italics are those which Oxford Economics identified that were not identified under the criteria used in the validation exercise.

Table 5.1: Adjustments to 2012 BRES data used in setting forecasts

Local authority	Sector	Correction
Mid Bedfordshire	Construction	Down by approximately 3,000 employee jobs
Luton	Real estate	Up by approximately 500 employee jobs
Luton	Employment activities	Up by approximately 1,600 employee jobs
Huntingdonshire	Transport manufacturing	Up by approximately 300 employee jobs
Huntingdonshire	Land Transport	Down by approximately 100 employee jobs
Colchester	Publishing and broadcasting	Down by approximately 700 employee jobs
Maldon	Land Transport	Down by approximately 300 employee jobs
Maldon	Health and care	Down by approximately 900 employee jobs
Thurrock	Chemicals manufacturing	Up by approximately 600 employee jobs
Dacorum	Food manufacturing	Down by approximately 200 employee jobs
East Hertfordshire	Professional services	Down by approximately 1,400 employee jobs
Hertsmere	Wholesale	Down by approximately 1,200 employee jobs
Watford	Real estate	Down by approximately 300 employee jobs
Welwyn Hatfield	Construction	Down by approximately 1,600 employee jobs
Breckland	Real estate	Up by approximately 200 employee jobs
Norwich	Waste and remediation	Down by approximately 200 employee jobs
St Edmundsbury	Business services	Down by approximately 4,500 employee jobs
Ashford	Construction	Up by approximately 1,200 employee jobs
Ashford	Land transport	Up by approximately 1,300 employee jobs
Canterbury	Health and care	Up by approximately 1,300 employee jobs
Dartford	Business services	Down by approximately 3,200 employee jobs

Note: The amount of jobs by which a sector has been adjusted does not necessarily reflect the size of the observed anomaly in the BRES data, as the 2013 adjusted value also includes an element of the trend employee growth that would have occurred if the correction had not been made

Census vs APS / LFS employment rates

EEFM uses resident employment rates which are anchored to the 2001 Census and since the EEFM 2013 update 2011 Census data has been incorporated on resident employment rates, with the denominator defined as population aged 16-74. The main annual source of resident employment data is the Labour Force Survey / Annual Population Survey, and this is used to calculate annual changes in employment rates.

However, in both 2001 and 2011, there are significant differences between these two data sources. Table 5.2 shows, for all authorities, the 2011 resident employment rates from the Census and the APS / LFS. Percentage point differences are shown in the third column. Note that, for consistency, the denominator in both cases is all people aged 16-64.

No clear reason for these differences has been found. There does not appear to be a consistent pattern to them. Cambridge shows the biggest positive difference, with an APS / LFS employment rate 11.6 percentage points higher than the Census rate. In the 2001 Census the difference is around 13.6 percentage points. It is possible that the difference is related to University students, who are normally counted at their term-time address in the Census but may not have been present on Census day due to their shorter terms, and who are also exempt from taking up employment during term-time but may take up employment during the rest of the year. A similar pattern is evident in Norwich which also has a substantial student population, where the APS / LFS employment rate is 8.1 percentage points higher. However when we compared the APS / LFS with the Census in 2001, there was little difference between the two measures. Maldon shows the largest

negative difference, where the APS / LFS 2011 resident employment rate is 12.1 percentage points lower than the Census estimate.

In the Model, resident employment rates are estimated as equal to the Census rates in 2001 and 2011 (with the 16-74 population as denominator), but increased every year in line with the growth in the LFS/APS employment rate (with the working-age population as denominator). This methodology was chosen to satisfy the request by the Model Steering Group that the EEFM's underlying data be consistent with the Census whenever possible. So although these discrepancies between the Census and LFS/APS employment rates are acknowledged here, they are not adjusted for in the EEFM.

Table 5.2: Census vs LFS employment rates

	Census 2011	LFS / APS 2011	Difference (pp)
Babergh	79.8	73.0	-6.8
Basildon	74.5	72.2	-2.3
Bedford	75.0	75.8	0.8
Braintree	79.1	77.2	-1.9
Breckland	77.0	75.0	-2.0
Brentwood	78.5	81.5	3.0
Broadland	81.2	77.9	-3.3
Broxbourne	77.6	78.7	1.1
Cambridge	65.8	72.1	6.3
Castle Point	76.9	72.7	-4.2
Chelmsford	79.4	74.7	-4.7
Colchester	74.9	74.9	0.0
Dacorum	78.7	76.6	-2.1
East Cambridgeshire	82.4	78.1	-4.3
East Hertfordshire	81.0	74.6	-6.4
Epping Forest	77.9	67.7	-10.2
Fenland	75.2	63.6	-11.6
Forest Heath	80.7	78.3	-2.4
Great Yarmouth	69.4	67.5	-1.9
Harlow	76.5	72.0	-4.5
Hertsmere	77.7	75.9	-1.8
Huntingdonshire	80.9	75.0	-5.9
Ipswich	74.6	73.3	-1.3
King's Lynn and West Norfolk	75.6	74.6	-1.0
Luton	67.2	64.9	-2.3
Maldon	79.0	64.8	-14.2
Mid Bedfordshire	80.1	77.6	-2.5
Mid Suffolk	81.4	79.7	-1.7
North Hertfordshire	80.4	75.5	-4.9
North Norfolk	75.0	74.4	-0.6
Norwich	68.6	72.1	3.5
Peterborough	73.3	70.5	-2.8
Rochford	78.9	76.8	-2.1
South Bedfordshire	79.5	76.9	-2.6
South Cambridgeshire	83.1	82.9	-0.2
South Norfolk	80.1	75.3	-4.8
Southend-on-Sea	73.9	69.7	-4.2
St Albans	80.1	78.9	-1.2
St Edmundsbury	80.8	76.8	-4.0
Stevenage	77.5	72.7	-4.8
Suffolk Coastal	79.0	81.9	2.9
Tendring	70.3	66.0	-4.3
Three Rivers	79.3	68.5	-10.8
Thurrock	74.7	70.1	-4.6
Uttlesford	81.1	79.1	-2.0
Watford	78.4	77.6	-0.8
Waveney	72.6	71.5	-1.1
Welwyn Hatfield	72.0	68.0	-4.0
East of England	**76.6**	**73.9**	**-2.7**

Note: The denominator used for the Census is all people aged 16-64. This is to ensure consistency with the LFS / APS

Data checking and validity procedures

A vital foundation of any economic modelling and forecasting work is ensuring that data is correctly sourced and accurately fed into the model. Oxford Economics has a policy of meticulously summing checking variables and carrying out visual checks throughout the process of updating the EEFM to ensure that the data is fully internally consistent.

Data is entered electronically from original official sources and is checked automatically to make sure identities are maintained. It is also checked visually to assess whether trends look plausible and magnitudes are correct.

There are a number of key identities in the EEFM which must hold for the Model to be fully realised, and we have a spreadsheet within it designed specifically to check that this is the case. These identities are:

- Employee jobs by sector = total employee jobs
- Self-employed jobs by sector = total self-employed jobs
- Employment by sector = total employment
- All indicators in each local authority = Eastern totals (note that this does not apply to house prices, productivity, and unemployment / resident employment rates)
- Total employment = employee jobs + self employed jobs + HM Armed Forces
- Total population = working age population + young population + elderly population
- Change in population = net migration + natural increase
- People-based employment = net commuting + resident-based employment
- Labour force = employment + unemployment

There are two principal methods that we apply to our models to ensure variables add up correctly over the forecast period:

1. **Scaling:** it is often the case that model input or output variables which are theoretically identical actually have different values. This is usually due to errors or incompleteness in the underlying data or methodological differences in gathering them. Scaling is the process by which two such variables are made equal by raising one to the value of the other, and the procedure can either be multiplicative or additive. Additive scaling takes the difference between the variables and adds it pro rata to the components of the lower of the two (for example, to local authority values when the total of these is less than a regional value to which it should theoretically be equal). Multiplicative scaling takes the ratio of the "target" total to the actual total, and multiplies each component of the actual total by that ratio. In this way, the actual total is shifted upwards (or downwards) to meet a target total which it should theoretically equal.

2. **Residual:** this procedure is used when the value of one component (or a small number of them) can be approximately deduced from the known values of other components and a known total. For example, estimating full time jobs as the residual between total jobs and part time jobs.

6: Performance monitoring

The following section outlines changes to key indicators since EEFM 2013 run, and includes comparison tables of each of the Model runs.

What's changed

Since the last EEFM update was in 2013, new data has been released for every variable in the model. Table 6.1 summarises the changes to the key data assumed for 2012 and 2013 (some arise from new data releases, some from updated estimates/forecasts, others from a mixture of the two). The largest change since the last update of the model is the incorporation of the Census 2011 commuting matrix.

Table 6.1: Changes to East of England data between the EEFM 2013 and EEFM 2014 runs

	EEFM 2013		EEFM 2014		Differences	
	2012	**2013**	**2012**	**2013**	**2012**	**2013**
Population (000s)	5920	5979	5907	5954	-14	-25
Employment (000s)	2864	2850	2868	2944	4	94
Resident employment (000s)	2792	2780	2878	2903	87	124
Resident employment rate (%)	65.2	64.4	67.4	67.6	2.2	3.1
Unemployment (000s)	115.2	114.5	115.2	102.2	0.0	-12.3
GVA (% growth)	-0.5	0.5	0.0	2.2	0.5	1.7
Dwellings (000s)	2550	2575	2550	2566	0	-9
Households (000s)	2466	2490	2466	2481	0	-9

Source: ONS, BRES, APS, Claimant Count (Nomis), Regional Accounts, DCLG
Note: GVA and resident employment rate differences are percentage point changes. All other differences are in thousands

In these EEFM 2014 forecasts, the level of **total employment** (the sum of employee jobs and self-employment jobs) in the East of England in 2012 is higher by 4,000 jobs than the equivalent figure in the EEFM 2013 forecasts. The 2013 level of employment in the East according to ONS Workforce Jobs is higher by an estimated 94,000 jobs compared to the estimate in the EEFM 2013 update.

Table 6.2: Changes to East of England sectoral data between the EEFM 2013 and EEFM 2014 runs (000s)

	EEFM 2013		EEFM 2014		Differences	
	2012	**2013**	**2012**	**2013**	**2012**	**2013**
Agriculture	39.2	36.6	37.0	35.4	-2.2	-1.2
Mining and Quarrying	1.4	1.4	1.9	1.7	0.4	0.3
Food Manufacturing	33.0	33.0	30.5	30.4	-2.5	-2.6
General Manufacturing	71.9	71.5	77.2	78.1	5.3	6.6
Chemicals	35.9	35.5	27.8	27.4	-8.1	-8.2
Pharma	7.2	7.2	6.4	6.4	-0.8	-0.8
Metals	29.1	28.9	34.8	34.4	5.8	5.6
Transport	45.4	45.1	44.0	43.5	-1.4	-1.6
Electronics	26.3	26.1	23.4	23.2	-2.9	-2.9
Utilities	14.7	12.5	12.6	13.6	-2.1	1.1
Waste and remediation	10.1	10.4	15.3	16.1	5.2	5.7
Construction	206.3	200.7	218.2	222.3	11.9	21.6
Wholesale	192.6	191.7	179.0	181.1	-13.7	-10.6
Retail	315.4	314.2	292.8	294.9	-22.6	-19.3
Land Transport	143.2	140.5	140.7	137.6	-2.6	-2.9
Water and air transport	5.9	6.0	5.8	5.7	0.0	-0.3
Hotels and restaurants	151.9	154.7	167.7	170.4	15.8	15.7
Publishing and broadcasting	25.0	25.6	24.2	26.0	-0.8	0.3
Telecoms	17.8	18.1	18.5	20.2	0.7	2.1
Computer related activity	57.8	59.3	55.8	60.8	-2.1	1.5
Finance	76.4	76.9	77.5	74.7	1.1	-2.1
Real Estate	41.3	41.9	42.1	44.8	0.7	2.8
Professional services	191.6	199.1	216.0	232.6	24.3	33.5
R+D	20.2	21.9	21.3	23.2	1.1	1.3
Business services	161.7	162.1	173.0	184.5	11.3	22.5
Employment activities	82.9	80.9	91.4	100.8	8.5	19.9
Public Administration incl land forces	111.3	109.9	116.3	114.8	5.1	4.8
Education	267.6	263.8	259.5	260.0	-8.2	-3.8
Health and care	314.4	307.5	320.6	337.4	6.2	29.8
Arts and entertainment	82.0	82.2	70.9	71.9	-11.1	-10.2
Other services	84.6	84.4	65.9	69.5	-18.8	-14.9
Total	**2864.4**	**2849.7**	**2868.1**	**2943.5**	**3.7**	**93.8**

Source: Oxford Economics, ONS Workforce Jobs

The largest of the downward revisions in 2012 between the EEFM 2013 and EEFM 2014 results occurred in retail, other services, wholesale and arts & entertainment. The largest upward revisions to 2012 data were in professional services, hotels and restaurants, construction and business services. Total jobs are 3,700 higher in the EEFM 2014 than in the 2013 model release.

Total jobs have been revised up by 93,800 jobs in 2013 in the EEFM2014. On a sectoral basis, the largest upward revisions occurred in professional services, health and care, business services and construction. The largest downward revisions were evident in retail, other services, wholesale and arts & entertainment (consistent with the downgrades to 2012 data).

In the EEFM 2014 run, the latest data available for **resident employment** was for 2013 from the APS. In 2012, resident employment levels are estimated to have been higher by around 87,000 jobs. In 2013, resident employment is 124,000 higher.

Claimant unemployment data for all of 2013 is now available for the East. This shows that unemployment is 12,300 claimants fewer than estimated in the EEFM 2013 run. The 2012 estimate of unemployment is unchanged since we had all 12 months of data available for 2012 at the time of the EEFM 2013 update.

GVA data in the EEFM 2014 run has been rebased from 2009 prices to 2010 prices, preserving consistency with the Blue Book. In addition, new regional data (2012) has been released since the EEFM 2013 run, with the growth rate revised up by 0.5pp.

Monitoring the forecasts

This section compares five-year forecasts across all of the EEFM runs. Each review table contains an 'outturn' column for 2008-13.

Population

Table 6.3 shows population growth over 2008-2013 in the Autumn 2007, Autumn 2008, Spring 2009, Autumn 2009, Spring 2010, Autumn 2010, EEFM 2012, EEFM 2013 and EEFM 2014 runs. Overall, we estimate an additional 245,100 people in the East over 2008-13. This outturn is almost 25,000 lower than anticipated in the EEFM 2013. The spread of the forecast change varies across districts, but is guided by the direction of change arising from the 2011 Census population figure published for each district. Peterborough enjoyed the highest upward revision of 5,600 people whilst Norwich suffered the biggest reduction.

Table 6.3: Comparison of projected population growth 2008-2013 (000s)

	Aut 07 2008-13	Aut 08 2008-13	Spr 09 2008-13	Aut 09 2008-13	Spr 10 2008-13	Aut 10 2008-13	EEFM 2012 2008-13	EEFM 2013 2008-13	EEFM 2014 2008-13	Outturn 2008-13
Babergh	2.3	4.2	4.0	3.4	3.1	2.7	0.5	1.6	1.0	1.0
Basildon	3.8	6.2	4.3	4.1	3.7	4.1	5.4	5.2	5.9	5.9
Bedford	7.3	7.8	6.7	5.5	5.8	4.9	8.0	6.5	7.2	7.2
Braintree	8.0	6.3	5.0	4.8	4.7	4.0	5.4	6.7	5.2	5.2
Breckland	5.5	6.4	5.9	4.8	4.9	5.0	6.6	4.6	4.0	4.0
Brentwood	3.9	2.6	1.1	1.8	1.7	3.1	5.2	2.9	2.5	2.5
Broadland	3.5	9.0	8.1	8.7	8.6	7.8	4.3	2.8	2.1	2.1
Broxbourne	1.8	3.8	2.6	2.9	3.2	3.3	2.2	4.0	3.3	3.3
Cambridge	5.6	14.0	12.3	11.2	10.3	12.3	15.2	9.7	10.5	10.5
Castle Point	1.9	2.4	1.3	1.0	0.8	0.6	2.0	0.9	0.5	0.5
Chelmsford	4.6	8.5	7.0	8.0	7.4	9.2	10.2	6.4	5.2	5.2
Colchester	6.0	9.2	8.8	8.6	6.7	8.7	15.9	10.1	9.7	9.7
Dacorum	4.3	5.4	4.3	5.9	5.8	6.7	6.1	6.8	7.4	7.4
East Cambridgeshire	4.6	5.2	4.4	4.0	3.1	4.9	7.4	6.4	4.9	4.9
East Hertfordshire	6.9	5.3	4.0	7.2	8.2	8.4	7.9	6.4	6.2	6.2
Epping Forest	3.4	4.4	2.3	2.9	2.9	3.4	3.2	3.0	3.8	3.8
Fenland	3.7	4.5	3.7	2.8	2.4	1.9	3.3	4.5	3.1	3.1
Forest Heath	1.6	3.6	3.4	3.2	3.2	4.4	6.6	4.0	3.7	3.7
Great Yarmouth	2.0	1.0	0.3	0.3	-0.3	0.0	1.5	3.2	1.9	1.9
Harlow	2.8	1.7	1.0	0.9	0.9	0.9	3.2	4.0	3.4	3.4
Hertsmere	2.9	4.8	2.8	3.5	3.5	3.6	5.5	4.9	3.6	3.6
Huntingdonshire	4.4	10.8	9.2	9.8	9.6	8.7	6.3	6.9	5.7	5.7
Ipswich	4.1	4.7	4.2	3.3	3.1	4.1	6.8	9.7	7.3	7.3
King's Lynn and West Norfolk	1.8	5.6	4.8	5.6	5.1	4.8	4.0	5.3	3.7	3.7
Luton	4.5	3.2	1.9	3.3	4.0	5.8	14.2	15.6	15.9	15.9
Maldon	1.7	2.2	1.9	2.3	2.3	3.2	2.2	0.9	0.5	0.5
Mid Bedfordshire	8.2	7.5	6.8	6.5	6.7	5.9	8.8	6.2	7.5	7.5
Mid Suffolk	4.2	3.3	3.4	5.3	4.7	5.0	5.7	4.9	3.4	3.4
North Hertfordshire	5.4	9.3	4.6	4.9	4.4	5.0	6.4	6.1	4.9	4.9
North Norfolk	4.0	1.7	1.3	0.8	0.6	0.0	2.0	2.2	1.1	1.1
Norwich	3.8	8.0	7.1	7.7	6.5	9.1	14.8	7.0	7.8	7.8
Peterborough	5.7	4.3	2.5	2.1	2.3	2.7	6.8	12.4	12.3	12.3
Rochford	1.6	2.9	2.3	3.2	3.0	2.5	2.9	1.5	0.8	0.8
South Bedfordshire	4.0	8.1	5.4	5.2	4.9	4.6	3.6	6.0	8.0	8.0
South Cambridgeshire	9.0	9.9	8.6	11.8	11.0	12.7	12.7	9.9	7.8	7.8
South Norfolk	4.2	7.2	6.5	7.2	6.9	7.8	10.4	9.7	8.8	8.8
Southend-on-Sea	0.7	8.0	5.9	5.3	5.0	4.1	3.6	8.4	7.6	7.6
St Albans	5.8	6.8	5.9	8.9	8.1	10.0	9.2	7.9	7.0	7.0
St Edmundsbury	3.1	6.3	5.8	5.5	5.6	5.5	4.3	6.7	4.3	4.3
Stevenage	5.4	1.8	0.8	2.0	1.8	1.5	2.4	3.8	3.8	3.8
Suffolk Coastal	0.3	7.3	5.9	6.7	5.6	4.6	5.1	3.7	0.5	0.5
Tendring	4.2	6.3	5.0	3.6	2.6	2.1	4.8	-0.8	-1.7	-1.7
Three Rivers	1.6	3.3	2.7	3.7	3.5	3.7	4.5	3.0	3.3	3.3
Thurrock	9.4	7.9	6.6	5.7	5.4	6.4	10.0	8.5	7.2	7.2
Uttlesford	3.6	2.5	2.2	2.5	2.6	3.1	5.8	6.2	7.2	7.2
Watford	3.3	3.6	0.6	1.7	1.3	2.4	6.0	8.0	8.9	8.9
Waveney	3.2	0.3	0.7	-0.4	-0.6	-0.6	-1.1	0.0	-0.4	-0.4
Welwyn Hatfield	4.1	5.3	5.2	4.4	4.1	4.5	8.5	6.1	6.6	6.6
East	**197.4**	**264.7**	**210.7**	**223.9**	**210.2**	**228.9**	**296.4**	**270.2**	**245.1**	245.1

Source: Oxford Economics

Employment

Table 6.4 shows five-year data/forecasts for jobs growth over 2008-13 in the Autumn 2007, Autumn 2008, Spring 2009, Autumn 2009, Spring 2010, Autumn 2010, EEFM 2012, EEFM 2013 and EEFM 2014 runs. Between the Autumn 2007 and Spring 2009 runs, the jobs growth forecast had gradually reduced, echoing the downward revisions being made by Oxford Economics to its UK forecasts as more information about the developing recession became available. However, by the time of the Autumn 2009 run, the employment data was showing that the impact of the recession on the labour market was mild in comparison with previous recessions, perhaps reflecting changes in the structure of the economy since then. Consequently, the Autumn 2009, Spring 2010 and Autumn 2010 EEFM runs all showed an improved position on 2008-13 jobs change relative to the previous forecasts, particularly as new published data had constantly been subject to upward revisions for the East. In the EEFM 2012 update, revisions to published data by the ONS resulted in a downward revision to the medium term outlook of jobs growth. This also reflected ongoing problems in the Eurozone and the continued impact of spending cuts. In the EEFM 2013 update, a contraction in jobs levels over the period 2008-13 was forecast of around 28,900 jobs. This is due to persistent problems in the Eurozone which appeared to be stalling the export led recovery. In the 2014 update, we have incorporated 2013 data at the regional level, which suggests a much faster labour market recovery than previously expected. Over the 2008-13 period, the number of jobs in the East of England are estimated to have risen by 77,000.

The areas estimated to have witnessed the largest gains during this 2008-13 period include South Norfolk, Hertsmere, Broxbourne, Basildon and Watford. The areas with the weakest job gains during this period include Norwich, Ipswich, Harlow and Bedford. The pace of recovery in each area ultimately depends on its sector mix, and in areas with more industry and manufacturing the recovery is likely to be weaker, with more positive outlooks in areas with a bigger professional services sector.

Over the 2008-13 period, the largest upward revisions to employment gains between the EEFM 2013 update and EEFM 2014 release are evident in Peterborough, Basildon and Hertsmere. Conversely, Welwyn Hatfield, South Cambridgeshire and Chelmsford have experienced the largest downgrades.

GVA

Table 6.5 shows five-year data/forecasts for GVA growth over 2008-13 in the Autumn 2007, Autumn 2008, Spring 2009, Autumn 2009, Spring 2010, Autumn 2010, EEFM 2012, EEFM 2013 and EEFM 2014 runs. As with employment, the five-year estimates became more negative as the recession gathered pace. In the EEFM 2014 run, we estimate that GVA growth contracted by 0.3% per annum over the period 2008-13.

Table 6.4: Comparison of employment growth between EEFM updates, 2008-2013 (000s)

	Aut 07 2008-13	Aut 08 2008-13	Spr 09 2008-13	Aut 09 2008-13	Spr 10 2008-13	Aut 10 2008-13	EEFM 2012 2008-13	EEFM 2013 2008-13	EEFM 2014 2008-13	Outturn 2008-13
Babergh	1.6	1.7	0.0	0.2	-0.1	0.6	-0.9	-1.3	0.4	-
Basildon	1.0	0.7	-4.1	-1.4	-1.9	-1.2	-5.5	-2.8	5.0	-
Bedford	3.1	1.6	-2.2	-2.0	-0.1	0.1	-3.9	-6.2	-1.5	-
Braintree	5.6	1.2	-2.9	-2.1	-0.8	-0.5	-3.5	-0.6	0.4	-
Breckland	3.2	2.8	0.4	-0.3	0.1	1.3	-0.5	0.0	1.5	-
Brentwood	3.3	1.2	-2.3	-1.4	-0.7	1.3	-3.0	1.2	4.6	-
Broadland	1.9	2.2	-1.1	-0.8	0.5	1.4	8.8	2.3	2.5	-
Broxbourne	0.7	0.9	-1.6	-1.6	-0.5	-0.6	-0.3	3.8	5.5	-
Cambridge	3.9	10.6	8.0	10.1	6.9	8.9	2.4	-0.4	4.3	-
Castle Point	1.2	0.5	-1.1	-0.8	-0.3	-0.3	0.2	-0.5	3.1	-
Chelmsford	4.4	3.5	-0.7	0.9	0.6	2.5	6.7	6.4	4.3	-
Colchester	4.1	3.0	-1.0	1.3	1.2	2.6	6.4	2.9	3.7	-
Dacorum	4.7	1.1	-2.9	-0.5	0.0	1.6	-0.9	-3.9	2.2	-
East Cambridgeshire	3.1	1.2	-0.6	0.2	0.6	2.2	2.9	3.1	2.6	-
East Hertfordshire	4.9	-0.6	-3.4	-1.9	-0.4	0.9	-4.0	-1.3	-1.1	-
Epping Forest	3.4	0.6	-2.5	-2.6	-0.3	1.1	4.4	1.2	3.1	-
Fenland	2.3	1.4	-0.1	0.0	2.2	2.9	1.6	0.4	-0.8	-
Forest Heath	0.6	1.3	-0.3	0.0	0.5	1.3	2.2	0.7	0.9	-
Great Yarmouth	2.4	-1.1	-2.7	-1.8	-1.2	-0.8	0.7	-0.5	2.0	-
Harlow	0.4	0.4	-2.4	-1.4	-4.6	-4.6	-4.0	-6.7	-2.3	-
Hertsmere	4.1	3.8	0.4	1.6	1.8	3.0	-3.2	-1.4	5.7	-
Huntingdonshire	2.2	2.3	-2.0	-1.0	-1.1	-0.3	-2.3	-5.6	-0.3	-
Ipswich	0.7	1.6	-1.0	-1.1	-0.4	0.2	-0.9	-5.0	-4.2	-
King's Lynn and West Norfolk	0.9	0.7	-2.3	-0.1	-0.5	1.1	-1.6	-1.7	2.7	-
Luton	2.6	0.7	-3.7	-2.9	2.9	3.5	2.6	-3.5	-1.4	-
Maldon	0.8	0.7	-0.3	0.3	1.1	1.6	-0.2	-1.0	0.5	-
Mid Bedfordshire	6.6	2.0	-0.7	0.3	0.9	1.6	7.0	-1.1	1.5	-
Mid Suffolk	1.6	0.2	-1.6	1.1	0.9	2.3	1.7	0.7	1.5	-
North Hertfordshire	4.4	3.4	-0.6	-1.1	-1.2	-0.3	-1.4	-2.8	1.3	-
North Norfolk	2.4	-0.7	-2.0	-1.0	-0.3	0.1	0.9	1.3	0.7	-
Norwich	2.0	0.8	-4.2	-3.1	-4.2	-3.5	-6.9	-9.1	-6.8	-
Peterborough	4.0	-1.4	-6.4	-6.3	-0.3	0.5	-2.4	-10.1	-1.2	-
Rochford	1.9	0.3	-0.9	-0.3	-0.2	0.0	-0.1	0.4	3.0	-
South Bedfordshire	2.5	2.2	-2.0	-1.4	-0.9	-0.6	1.1	-0.8	4.5	-
South Cambridgeshire	5.5	2.5	-2.2	3.0	1.0	3.3	5.5	3.6	0.5	-
South Norfolk	2.5	2.9	0.3	2.0	2.9	4.8	7.8	6.0	7.7	-
Southend-on-Sea	1.3	2.3	-2.5	-1.3	-3.0	-3.0	-6.4	-4.0	0.3	-
St Albans	5.2	3.2	-0.9	1.8	-4.9	-3.9	-1.1	-3.1	-1.3	-
St Edmundsbury	1.9	2.5	-0.3	-0.1	0.8	1.3	5.9	5.7	4.6	-
Stevenage	4.4	2.6	-0.8	1.2	1.6	1.9	2.9	2.7	3.2	-
Suffolk Coastal	1.7	2.4	-0.9	0.1	1.9	3.2	0.7	0.6	1.5	-
Tendring	2.1	1.0	-1.4	-0.7	-0.2	0.0	-0.1	-0.8	2.2	-
Three Rivers	1.2	0.9	-0.8	0.3	0.5	1.4	-2.5	-2.7	0.6	-
Thurrock	3.4	2.6	-0.2	-0.3	0.9	-0.5	4.5	2.4	1.1	-
Uttlesford	3.2	0.1	-0.9	-0.4	0.1	0.7	0.4	0.1	2.0	-
Watford	1.6	0.5	-4.1	-3.0	-1.0	0.9	1.2	-1.2	4.8	-
Waveney	1.6	-1.7	-2.5	-2.0	-1.1	-1.0	-1.4	-3.2	-1.4	-
Welwyn Hatfield	5.0	1.2	-1.9	-1.3	0.4	1.7	4.2	7.0	3.4	-
East	**133.2**	**73.7**	**-69.7**	**-21.9**	**0.1**	**41.1**	**25.8**	**-28.9**	**77.0**	-

Source: Oxford Economics

Table 6.5: Comparison of GVA growth per annum between EEFM updates, 2008-2013 (avg%pa)

	Aut 07 2008-13	Aut 08 2008-13	Spr 09 2008-13	Aut 09 2008-13	Spr 10 2008-13	Aut 10 2008-13	EEFM 2012 2008-13	EEFM 2013 2008-13	EEFM 2014 2008-13	Outturn 2008-13
Babergh	-0.9	3.0	1.2	1.4	0.9	1.1	-0.7	-1.2	-0.9	-
Basildon	-0.2	2.9	1.2	1.6	0.9	1.2	-1.6	-1.0	-0.2	-
Bedford	0.3	2.4	0.8	0.8	1.1	1.3	-0.3	-0.9	0.3	-
Braintree	0.1	2.6	0.7	1.0	0.6	0.9	-0.3	0.8	0.1	-
Breckland	0.5	2.9	1.5	1.5	1.4	1.8	0.0	1.0	0.5	-
Brentwood	1.0	3.4	1.2	1.4	1.0	1.9	-2.7	0.6	1.0	-
Broadland	2.0	3.1	0.8	1.5	1.7	1.9	4.6	3.1	2.0	-
Broxbourne	1.5	2.8	0.8	0.9	1.1	1.2	1.6	2.0	1.5	-
Cambridge	-0.5	4.3	3.4	3.4	3.4	3.7	-0.6	-1.3	-0.5	-
Castle Point	2.2	2.5	0.5	0.8	1.6	1.8	0.5	-0.3	2.2	-
Chelmsford	0.0	3.1	1.7	1.9	0.8	1.3	1.5	1.8	0.0	-
Colchester	-1.0	3.2	1.4	1.9	1.1	1.5	1.9	1.1	-1.0	-
Dacorum	-0.8	2.7	0.7	1.1	0.5	1.1	0.5	-1.7	-0.8	-
East Cambridgeshire	0.7	3.0	0.7	1.4	1.3	2.1	2.8	2.5	0.7	-
East Hertfordshire	-1.2	2.4	0.6	1.0	1.4	1.7	-0.1	-0.4	-1.2	-
Epping Forest	0.7	2.1	0.4	0.3	0.8	1.4	0.3	0.2	0.7	-
Fenland	0.3	2.9	1.5	1.5	2.3	2.6	2.2	1.9	0.3	-
Forest Heath	-0.3	2.7	1.5	1.5	0.9	1.5	1.6	0.8	-0.3	-
Great Yarmouth	1.3	1.8	0.5	0.7	0.7	1.1	1.0	0.1	1.3	-
Harlow	-5.2	2.7	1.0	1.2	-1.7	-1.5	-4.6	-6.7	-5.2	-
Hertsmere	0.8	4.0	1.8	2.1	2.5	3.0	0.9	-0.3	0.8	-
Huntingdonshire	0.1	2.7	1.0	1.3	1.1	1.4	0.9	-0.5	0.1	-
Ipswich	-2.1	2.8	1.6	1.5	1.1	1.3	-0.7	-1.5	-2.1	-
King's Lynn and West Norfolk	1.2	2.3	0.9	1.5	0.7	1.0	0.9	0.9	1.2	-
Luton	-2.1	2.7	1.1	1.0	2.0	2.2	0.0	-2.1	-2.1	-
Maldon	1.6	2.7	1.6	1.7	1.8	2.2	1.8	1.1	1.6	-
Mid Bedfordshire	-0.3	2.8	1.2	1.5	0.8	1.1	3.6	-0.9	-0.3	-
Mid Suffolk	-1.9	2.1	0.5	1.8	1.6	2.2	0.3	-1.1	-1.9	-
North Hertfordshire	2.8	3.5	1.6	1.4	0.9	1.3	2.6	1.2	2.8	-
North Norfolk	0.5	1.7	0.2	0.9	1.0	1.1	0.7	1.9	0.5	-
Norwich	-3.7	2.9	1.4	1.7	0.4	0.7	-2.6	-3.3	-3.7	-
Peterborough	-1.0	2.3	0.8	0.9	1.3	1.4	0.3	-1.8	-1.0	-
Rochford	-0.1	2.6	1.4	1.6	0.2	0.4	-1.8	-1.3	-0.1	-
South Bedfordshire	3.1	3.1	0.7	0.8	-0.8	-0.5	0.5	0.7	3.1	-
South Cambridgeshire	0.3	3.3	1.3	2.4	1.3	2.1	1.8	1.6	0.3	-
South Norfolk	2.7	3.0	1.4	2.1	2.8	3.2	3.6	3.4	2.7	-
Southend-on-Sea	-1.0	2.7	0.7	1.1	0.2	0.4	-1.6	-1.4	-1.0	-
St Albans	-1.3	3.5	1.8	2.2	1.3	1.6	0.1	-0.7	-1.3	-
St Edmundsbury	1.9	2.7	1.1	1.4	2.0	2.2	4.3	3.6	1.9	-
Stevenage	1.8	4.0	2.2	2.4	2.1	2.5	2.2	2.7	1.8	-
Suffolk Coastal	-0.8	3.1	0.9	0.8	1.4	1.9	-0.2	-0.5	-0.8	-
Tendring	0.5	2.3	0.8	0.9	0.8	1.1	-0.3	-0.5	0.5	-
Three Rivers	-2.4	2.9	1.6	2.1	1.3	1.8	-1.1	-2.7	-2.4	-
Thurrock	-1.6	2.9	1.5	1.1	1.0	1.0	-0.3	-1.2	-1.6	-
Uttlesford	1.2	2.6	1.5	1.2	1.5	1.9	-0.3	0.0	1.2	-
Watford	-0.8	2.9	0.2	0.6	1.9	2.6	-2.0	-2.4	-0.8	-
Waveney	-1.2	1.5	0.4	0.7	0.9	1.1	0.4	-1.1	-1.2	-
Welwyn Hatfield	-0.6	2.9	1.3	1.2	1.1	1.6	-0.2	1.1	-0.6	-
Eastern	**-0.3**	**2.9**	**1.2**	**1.4**	**1.2**	**1.6**	**0.4**	**-0.2**	**-0.3**	-

Source: Oxford Economics

Monitoring the long-term forecasts

This section includes tables which compare long term change to population, employment and GVA forecasts across each of the model releases. This follows on from requests from the Model Steering Group. However, the long term outlook is based on a complexity of assumptions with each model run, each of which has been outlined in the report which accompanies each model release. As such, these tables are not accompanied by a recap of the assumptions as this information can be found by looking at previous reports.

Table 6.6: Comparison of population growth between EEFM updates, 2011-2031 (000s)

	Aut 08 2011-31 (000s)	Spr 09 2011-31 (000s)	Aut 09 2011-31 (000s)	Spr 10 2011-31 (000s)	Aut 10 2011-31 (000s)	EEFM 2012 2011-31 (000s)	EEFM 2013 2011-31 (000s)	EEFM 2014 2011-31 (000s)
Babergh	14.8	11.8	12.9	12.8	13.8	7.5	5.8	8.4
Basildon	20.3	12.7	14.1	14.0	13.6	19.2	21.8	27.9
Bedford	31.4	21.8	23.8	22.4	16.5	25.7	23.7	24.9
Braintree	20.7	14.9	15.3	14.6	12.7	21.3	27.0	26.0
Breckland	18.5	13.4	17.0	18.2	16.5	25.6	21.3	18.3
Brentwood	13.2	6.2	5.2	4.8	6.5	7.9	7.4	9.0
Broadland	32.1	30.7	31.1	31.0	30.4	15.3	10.4	7.8
Broxbourne	15.4	10.5	12.1	12.8	13.4	11.0	16.2	14.2
Cambridge	59.0	57.7	33.9	32.0	37.2	27.0	28.0	28.5
Castle Point	7.4	2.9	3.5	2.2	2.3	10.0	6.1	2.5
Chelmsford	27.3	21.8	23.9	22.0	25.2	34.0	24.9	21.8
Colchester	29.2	21.5	22.5	18.4	15.7	30.5	39.6	37.1
Dacorum	25.1	20.9	19.9	18.7	19.0	15.6	18.3	13.1
East Cambridgeshire	24.4	24.6	21.4	16.3	23.0	28.0	28.3	23.0
East Hertfordshire	29.6	28.4	31.7	31.7	31.8	25.0	26.6	26.4
Epping Forest	16.4	11.4	13.9	11.7	13.0	13.1	11.5	13.4
Fenland	11.4	7.4	11.0	11.8	10.0	21.3	23.9	13.3
Forest Heath	12.0	5.8	5.9	6.6	6.4	13.7	11.8	9.2
Great Yarmouth	12.4	6.4	7.5	7.0	6.4	12.5	14.1	12.8
Harlow	12.7	6.6	7.7	6.7	3.7	12.8	14.0	9.6
Hertsmere	21.1	11.7	11.5	10.6	12.2	13.1	18.0	17.2
Huntingdonshire	40.5	33.5	30.9	27.7	27.0	23.2	27.3	22.6
Ipswich	22.4	16.0	16.9	15.3	13.0	25.4	29.6	29.0
King's Lynn and West Norfolk	15.2	10.5	25.4	30.3	27.8	22.5	24.6	22.3
Luton	8.4	-6.6	9.8	17.3	12.9	37.8	34.5	34.1
Maldon	10.2	7.8	8.4	7.9	8.6	8.7	5.4	5.9
Mid Bedfordshire	37.1	34.8	29.8	29.9	31.8	40.6	30.1	29.1
Mid Suffolk	10.9	7.9	18.5	17.2	19.4	21.3	21.0	18.2
North Hertfordshire	42.8	16.3	16.1	16.0	17.8	22.2	25.7	20.7
North Norfolk	4.0	1.9	2.2	3.2	3.3	12.3	10.4	7.0
Norwich	28.0	17.0	17.9	19.7	15.2	31.9	24.8	23.8
Peterborough	17.1	11.5	14.9	12.7	10.7	32.6	34.7	42.2
Rochford	6.0	2.2	6.2	4.7	4.7	11.0	9.4	9.2
South Bedfordshire	32.4	14.3	16.2	19.0	18.2	17.1	17.7	17.5
South Cambridgeshire	47.2	46.9	39.9	39.5	48.9	43.0	43.6	38.3
South Norfolk	28.9	26.9	29.2	29.5	30.9	31.7	36.5	29.4
Southend-on-Sea	25.3	14.7	16.3	17.0	14.8	9.4	17.5	17.5
St Albans	34.8	30.3	23.9	23.3	28.5	25.3	23.2	22.8
St Edmundsbury	24.4	20.8	20.7	19.1	18.7	13.8	23.0	21.3
Stevenage	13.1	9.1	10.2	10.7	10.3	10.0	8.2	13.5
Suffolk Coastal	25.8	18.9	20.5	19.1	20.0	26.0	25.6	17.0
Tendring	32.8	20.4	20.4	19.7	12.5	28.0	11.8	11.8
Three Rivers	14.4	10.7	9.2	8.5	11.9	10.8	9.7	8.9
Thurrock	33.1	22.5	25.9	23.0	21.1	39.7	34.8	32.2
Uttlesford	9.0	12.4	11.3	9.5	11.2	9.4	13.2	13.8
Watford	19.3	6.9	5.1	4.1	8.4	12.6	17.3	19.5
Waveney	4.4	5.2	5.9	6.1	4.2	8.3	5.5	8.9
Welwyn Hatfield	28.5	24.0	17.5	19.2	23.1	25.9	24.3	27.2
Eastern	**1070.4**	**786.1**	**815.3**	**796.0**	**803.9**	**990.7**	**988.4**	**928.4**

Source: Oxford Economics

Table 6.7: Comparison of employment growth between EEFM updates, 2011-2031 (000s)

	Aut 08 2011-31 (000s)	Spr 09 2011-31 (000s)	Aut 09 2011-31 (000s)	Spr 10 2011-31 (000s)	Aut 10 2011-31 (000s)	EEFM 2012 2011-31 (000s)	EEFM 2013 2011-31 (000s)	EEFM 2014 2011-31 (000s)
Babergh	13.3	9.3	9.7	9.6	9.7	5.1	2.5	5.3
Basildon	14.6	9.5	11.4	4.1	4.2	-0.3	5.9	17.1
Bedford	18.6	10.6	11.2	8.4	2.8	9.3	3.8	9.4
Braintree	10.9	5.1	5.9	4.9	2.7	7.0	8.6	13.5
Breckland	14.0	11.5	6.9	6.3	4.5	4.3	4.0	6.4
Brentwood	12.8	3.9	3.7	1.2	2.8	3.5	7.0	12.3
Broadland	9.8	9.6	10.0	10.5	7.4	8.3	1.7	0.8
Broxbourne	10.2	5.6	6.2	2.9	2.5	3.7	6.4	11.3
Cambridge	57.5	53.6	40.3	32.7	35.9	22.1	20.3	24.2
Castle Point	5.9	3.1	3.5	1.3	0.6	2.0	0.1	4.8
Chelmsford	22.4	18.6	21.3	14.2	13.6	35.9	21.6	21.3
Colchester	15.7	11.7	14.1	12.9	8.7	18.1	14.1	13.4
Dacorum	23.3	15.6	16.5	12.9	11.0	10.5	7.8	9.4
East Cambridgeshire	13.2	11.6	11.0	7.7	8.2	7.7	9.4	8.2
East Hertfordshire	11.1	11.9	13.6	8.1	6.8	9.6	12.3	9.5
Epping Forest	9.4	7.5	9.1	4.2	3.2	11.2	8.5	9.7
Fenland	6.0	5.8	5.9	7.5	5.4	4.9	8.4	7.3
Forest Heath	9.1	4.0	3.9	3.8	3.2	3.3	3.4	3.1
Great Yarmouth	5.5	3.0	3.5	0.7	-1.1	4.0	4.1	5.4
Harlow	13.0	0.1	0.3	0.0	-2.2	3.9	4.2	7.5
Hertsmere	31.0	18.7	19.8	15.3	15.7	7.0	8.3	19.5
Huntingdonshire	19.3	11.7	10.8	6.3	3.4	5.0	4.5	10.0
Ipswich	17.3	12.9	12.8	8.0	4.6	12.7	11.4	12.4
King's Lynn and West Norfolk	1.9	1.1	11.6	16.2	12.7	3.6	2.0	8.4
Luton	14.4	5.0	9.5	22.2	17.7	16.1	9.3	11.3
Maldon	6.1	4.1	4.4	2.5	2.5	4.0	2.4	4.7
Mid Bedfordshire	16.6	15.9	14.4	11.2	10.3	13.2	9.0	13.1
Mid Suffolk	3.0	0.5	11.1	9.8	9.1	4.4	4.4	5.7
North Hertfordshire	26.7	10.5	5.5	5.3	4.4	5.5	4.3	7.0
North Norfolk	1.0	1.1	1.1	2.5	0.9	2.4	2.1	1.0
Norwich	14.3	11.3	11.9	12.5	8.7	16.5	17.1	16.5
Peterborough	9.2	10.9	11.7	6.2	3.7	17.6	11.0	32.0
Rochford	2.2	1.5	2.5	1.7	1.0	3.4	1.4	5.2
South Bedfordshire	19.3	5.0	5.7	3.9	3.1	4.8	6.0	13.7
South Cambridgeshire	29.0	21.3	21.2	25.2	27.6	24.8	16.2	19.3
South Norfolk	19.8	15.7	17.9	15.2	12.8	9.3	12.2	15.4
Southend-on-Sea	16.4	10.3	10.8	6.4	3.3	3.8	7.3	12.6
St Albans	27.7	18.1	17.1	16.7	16.9	16.8	18.2	18.1
St Edmundsbury	16.5	12.8	12.6	8.8	6.6	5.5	4.5	4.8
Stevenage	17.7	10.1	11.4	11.5	10.7	3.5	5.0	4.4
Suffolk Coastal	12.9	11.0	11.7	9.6	8.6	6.1	9.5	9.4
Tendring	10.4	5.5	5.1	4.7	1.0	5.6	3.6	5.8
Three Rivers	7.2	4.4	4.3	3.6	3.9	4.7	5.3	9.9
Thurrock	19.5	13.3	13.6	9.9	6.7	29.7	19.2	19.8
Uttlesford	4.2	8.9	8.0	5.6	4.2	3.9	6.4	7.0
Watford	23.5	10.6	10.7	3.2	6.2	21.9	16.0	24.0
Waveney	-1.2	2.2	2.3	2.7	0.5	0.4	0.4	3.2
Welwyn Hatfield	17.0	9.7	7.1	13.1	13.6	19.6	22.7	17.0
Eastern	**699.3**	**475.7**	**494.5**	**413.5**	**350.2**	**445.8**	**393.7**	**531.1**

Source: Oxford Economics

Table 6.8: Comparison of GVA growth per annum between EEFM updates, 2011-2031 (% pa)

	Aut 08 2011-31 (% pa)	Spr 09 2011-31 (% pa)	Aut 09 2011-31 (% pa)	Spr 10 2011-31 (% pa)	Aut 10 2011-31 (% pa)	EEFM 2012 2011-31 (% pa)	EEFM 2013 2011-31 (% pa)	EEFM 2014 2011-31 (% pa)
Babergh	2.9	2.8	2.7	2.9	3.0	2.7	2.3	2.3
Basildon	2.8	3.0	2.9	2.2	2.2	1.9	2.4	2.7
Bedford	2.5	2.5	2.3	2.2	2.0	2.4	2.1	2.2
Braintree	2.5	2.6	2.4	2.0	2.0	2.4	2.6	2.5
Breckland	2.6	2.9	2.4	2.2	2.2	2.2	2.3	2.2
Brentwood	3.3	3.1	2.6	2.1	2.2	2.4	2.9	3.1
Broadland	2.7	2.8	2.8	2.6	2.6	2.8	2.1	1.8
Broxbourne	2.7	2.8	2.5	2.1	2.2	2.4	2.6	2.6
Cambridge	3.9	4.6	3.6	3.3	3.2	2.8	2.9	2.9
Castle Point	2.7	2.7	2.4	1.8	1.9	2.0	1.8	2.5
Chelmsford	2.9	3.2	3.0	2.3	2.3	3.2	2.9	2.3
Colchester	2.8	2.7	2.5	2.3	2.2	2.7	2.7	2.0
Dacorum	3.0	3.0	2.6	2.5	2.5	2.7	2.6	2.2
East Cambridgeshire	3.4	3.4	3.3	2.8	3.1	3.0	3.1	2.5
East Hertfordshire	2.5	2.8	2.5	2.4	2.4	2.6	2.7	2.2
Epping Forest	2.2	2.5	2.3	1.9	2.0	2.7	2.7	2.5
Fenland	2.5	2.8	2.5	2.5	2.4	2.5	2.9	2.5
Forest Heath	2.8	2.8	2.3	2.3	2.3	2.5	2.6	2.2
Great Yarmouth	2.5	2.6	2.2	1.8	1.7	2.1	2.1	2.3
Harlow	3.0	2.6	2.4	1.9	1.7	2.2	2.3	2.4
Hertsmere	4.0	3.7	3.5	3.2	3.3	2.7	2.5	2.7
Huntingdonshire	2.7	2.7	2.5	2.0	2.0	2.2	2.2	2.2
Ipswich	2.8	2.9	2.8	2.3	2.1	2.6	2.6	2.3
King's Lynn and West Norfolk	2.0	2.3	2.7	2.8	2.7	2.0	2.0	2.1
Luton	2.4	2.5	2.4	2.9	2.8	2.7	2.3	1.7
Maldon	2.6	2.9	2.5	2.1	2.2	2.7	2.4	2.5
Mid Bedfordshire	2.9	3.2	2.8	2.7	2.7	2.8	2.4	2.5
Mid Suffolk	2.0	1.9	2.9	2.8	2.9	2.3	2.2	1.9
North Hertfordshire	3.5	3.1	2.5	2.3	2.4	2.5	2.3	2.3
North Norfolk	1.8	1.9	1.8	1.9	1.9	2.1	2.2	1.6
Norwich	2.5	2.9	2.8	2.5	2.4	2.7	2.8	2.3
Peterborough	2.2	2.9	2.8	2.4	2.2	2.7	2.5	3.1
Rochford	2.4	2.9	2.5	2.0	2.1	2.4	2.0	2.4
South Bedfordshire	3.2	2.6	2.3	2.0	2.0	2.4	2.8	3.3
South Cambridgeshire	3.4	3.6	3.4	3.5	3.5	3.2	3.0	2.9
South Norfolk	3.2	3.2	3.1	2.9	2.8	2.5	2.9	2.7
Southend-on-Sea	2.7	2.8	2.5	2.2	2.0	2.0	2.3	2.4
St Albans	3.4	3.6	3.1	3.0	2.9	2.9	3.1	2.6
St Edmundsbury	2.7	2.8	2.6	2.4	2.3	2.3	2.3	1.8
Stevenage	3.6	3.7	3.4	3.0	2.9	2.2	2.6	2.1
Suffolk Coastal	2.7	2.5	2.4	2.4	2.4	2.4	2.5	2.3
Tendring	2.6	2.4	2.1	1.9	1.9	2.2	2.1	2.1
Three Rivers	2.7	3.0	2.7	2.3	2.4	2.6	2.5	2.3
Thurrock	2.9	3.0	2.7	2.3	2.3	3.9	3.1	2.9
Uttlesford	2.3	3.2	2.8	2.4	2.4	2.3	2.5	2.4
Watford	3.4	3.1	2.8	2.2	2.4	3.3	3.1	3.4
Waveney	1.8	2.3	2.0	2.0	2.0	1.9	1.8	1.7
Welwyn Hatfield	2.9	2.9	2.4	2.7	2.8	3.0	3.1	2.3
Eastern	2.8	3.0	2.7	2.5	2.5	2.6	2.6	2.4

Source: Oxford Economics

7: Employment land use methodology

This chapter outlines our methodology for calculating employment land use forecasts under the 2014 update of the East of England Forecasting Model (EEFM).

Key outputs

The summary outputs under the employment land module for EEFM 2014 for the East of England and each district include:

- Industrial floorspace (B1c/B2), thousands m²
- Warehouse floorspace (B8), thousands m²
- Office floorspace (B1a/b), thousands m²

Detailed outputs including the variables above split by sector are available on the website.

Measure of employment

The employment forecasts used in the calculation to estimate employment land requirements are:

- Jobs-based
- Workplace-based
- Full-time equivalents (estimated as the number of full-time employed, plus 75% of the number of part-time employed)

Employment densities

The employment densities used within the EEFM are based on the Employment Densities Guide, published in 2010[1], which provides guidelines on employment densities by use class. The guide presents densities on a range of different floorspace measures: gross external area (GEA), gross internal area (GIA) or net internal area (NIA). Therefore, it has been necessary to convert all employment densities to the same measure – GIA.

[1] Employment Densities Guide, Homes & Communities Agency, 2010

Table 7.1: Employment densities by use, 2010 guide

Use	Use class	Use Type	Area per FTE (m²)	Floor Area Basis	Comment on potential variation
Industrial	B2	General	36	GIA	Range of 18 -60m²
Industrial	B1 (c)	Light Industry (Business Park)	47	NIA	
Warehouse & Distribution	B8	General	70	GEA	Range of 25 -115 m²
Warehouse & Distribution	B8	Large Scale and High Bay Warehousing	80	GEA	
Office	B1 (a)	General Office	12	NIA	
Office	B1 (a)	Call Centres	8	NIA	
Office	B1 (a)	IT/ Data Centres	47	NIA	
Office	B1 (a)	Business Park	10	NIA	
Office	B1 (a)	Serviced Office	10	NIA	

The following employment densities have been adopted for Industry and Warehousing, based on the general use types. The GEA for warehousing has been converted to GIA by using the CLG's Regional Spatial Strategy and Local Development Framework Core Output Indicators – Update 2/2008 guidance[2] which assumes a 3.75% difference.

For office use, the HCA guidance states that the GIA is typically 15-20% higher than net internal space. Using this figure this provides an employment density range for general office of 13.8 m² - 14.4 m².

Table 7.2: Employment densities – industry, warehousing and office (GIA)

Use	Use type	Density: Area per FTE (m²)	Notes:
Industry	B1c/B2	36	Uses General Industry
Warehousing	B8	67	Uses General Warehousing
Offices	B1	14 (based on the average of the range 13.8- 14.4)	Uses General Office

For detailed office uses the same process has been followed for call centres, business parks and serviced office whilst office headquarters are assumed to follow the general employment land density. As the guidance does not provide densities for R&D, science parks and small businesses uses these are assumed to follow the original densities from the 2001 guide. An alternative could be to use the B1c density, given the

[2] https://www.gov.uk/government/publications/employment-densities-guide

earlier employment land density guide showed densities for these uses similar to light industry. However, this would result in an overall density of around 60m², which seems very high when compared to the 2001 densities and is very close to the warehousing density.

Overall the following employment densities for detailed office use are used.

Table 7.3: Employment densities detailed office use

Use	Sub-use	Density: Area per FTE (m²)	Notes:
Office	*B1b use split:*		
	Science park & Small business units	32	Based on 2001 density guide
	High tech R&D	29	
	B1a split:		
	General Office	14	Based on NIA densities adjusted to GIA (average range of 15-20%)
	Serviced business centre & Business park	13	
	Call centre	10	

Allocating employment sectors to use classes

In order to forecast employment land it is necessary to convert the employment sector forecasts into office, warehousing and industrial uses. As the model provides employment sector forecasts by 31 sectors in total (comprising one or several 2 digit SIC codes) we have allocated each sector across the use classes in differing proportions. This analysis has been largely based on reviewing each SIC code in detail and judging the overall proportion that could be expected to be in industry, warehousing or office uses based on our knowledge of the East of England's economy. This is not an exact science as the classification of economic activities does not always lend itself to a straightforward allocation.

The EEFM sectors are mapped to use classes in differing proportions, as outlined in Table 7.4. Those sectors marked with a * need careful consideration given the nature of the activities undertaken, namely:

- **Waste and remediation -** we have allocated 97% of these activities to industry use to capture waste treatment activities (based on the 2012 employee share in BRES by detailed SIC codes).

- **Construction -** we have not included construction in B-use, however, we are aware that often this is classified as industry use.

- **Wholesale trade and repair of motor vehicles and motorcycles -** we have allocated 75% of this sector to warehousing based on the share of wholesale warehousing activities in the 2012 BRES numbers. The remaining 25% associated with the repair of motor vehicles has been allocated to industry.

- **Land transport** - we have allocated 39% of this sector to warehousing based on the share of warehousing and support activities for transportation in the 2012 employee BRES numbers.

- **Professional services** - we have allocated 96% of this sector to offices. We have excluded veterinary activities based on the share of employees in the 2012 BRES numbers.

- **Business services** - we have allocated 93% of this sector to offices. We have excluded travel agency, tour operator and other reservation services based on the share of employees in the 2012 BRES numbers.

- **Employment activities -** given that this sector includes temporary workers that may work in any industry we have allocated employment based on the weighted shares of all the other sectors' allocations to industry, warehousing and offices.

- **Publishing & broadcasting activities** - we have allocated all publishing activity to industry. For motion picture, video and television programme production, sound recording and music publishing activities which captures the production side of film and TV we have assigned 80% to warehousing given the large scale production sets often required and 20% to office use. For programming and broadcasting activities which incorporates broadcasting activities which are most likely to be studio based we have assigned 80% of these activities to office use and 20% to warehousing use. The proportions are then scaled depending on the relative employment shares in the 2012 BRES data.

- **Telecoms** - we have allocated 80% of telecoms to warehousing and the remaining 20% to offices.

- **Public administration** - we have allocated 61% of this sector to offices to take account of the share of general public administration activities; regulation of the activities of providing health care, education, cultural services and other social services, excluding social security; regulation of and contribution to more efficient operation of businesses; and foreign affairs. We have excluded defence activities; justice and judicial activities; public order and safety activities; fire service activities; and compulsory social security activities. The shares are based on the 2012 BRES data.

We would appreciate feedback on these sectors or any others, bearing in mind that a simple calculation is applied across the East of England. Densities and allocations are static across the decades in the spreadsheets, as we have made no assumptions about the impacts of changing working practices. We have applied assumptions across the whole region, rather than reflecting any local circumstances. An interactive version of the spreadsheets is available so that users can apply their own assumptions to reflect any specific local circumstances. Please see the Cambridgeshire Insight website for more information.

Table 7.4: Allocation of employment sectors by use class, SIC 07

SIC code	SIC description	Industry	Warehousing	Offices
		B1c/B2	B8	B1
01-03	Agriculture			
05-09	Mining and Quarrying			
10-12	Food Manufacturing	100%		
13-18, 31-33	General Manufacturing	100%		
19-23 excl. 21	Chemicals excl. pharmaceuticals	100%		
21	Pharmaceuticals	100%		
24-25	Metals manufacturing	100%		
28-30	Transport equipment, machinery & equipment	100%		
26-27	Electronics	100%		
35-37	Utilities			
38-39*	Waste and remediation	97%		
41-43*	Construction			
45-46*	Wholesale	25%	75%	
47	Retail			
49,52-53*	Land Transport		39%	
50-51	Water and air transport			
55-56	Hotels and restaurants			
58-60*	Publishing and broadcasting	66%	23%	11%
61*	Telecoms		80%	20%
62-63	Computer related activity			100%
64-66	Finance			100%
68	Real Estate			100%
69-75 excl 72*	Professional services			96%
72	Research & development			100%
77-82 excl 78*	Business services			93%
78*	Employment activities	12%	8%	22%
84*	Public administration			61%
85	Education			
86-88	Health and care			
90-93	Arts and entertainment			
94-99	Other services			

Detailed office uses

The sectors with some element of office use have also been assigned into the more detailed breakdown of office uses as shown in Table 7.5 below. Again, we would appreciate any feedback on these allocations.

Table 7.5: Allocation of office employment sectors by detailed office use classes, SIC 07

SIC code	SIC description	Offices	Split by:				
			B1b	B1b	B1a	B1a	B1a
		B1	Science Park& Small business units	Tech/ R&D	General Office	Serviced Business Centre & Business Park	Call Centre
58-60	Publishing and broadcasting	11%	0%	0%	11%	0%	0%
61	Telecoms	20%	0%	0%	20%	0%	0%
62-63	Computer related activity	100%	0%	0%	30%	60%	10%
64-66	Finance	100%	0%	0%	100%	0%	0%
68	Real Estate	100%	0%	0%	90%	10%	0%
69-75 excl 72	Professional services	96%	7%	7%	79%	2%	1%
72	Research & development	100%	20%	60%	10%	10%	0%
77-82 excl 78	Business services	93%	71%	1%	9%	4%	9%
78	Employment activities	22%	5%	1%	13%	2%	1%
84	Public administration	61%	0%	0%	61%	0%	0%

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