OXFORD ECONOMICS

East of England Forecasting Model

Technical Report: Model description and data sources

EEFM 2012

REGIONAL FORECASTS

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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 on Excel spreadsheets, allowing users to produce scenarios under which the impacts of a given scenario can be monitored.

In 2012, the EEFM has been redesigned to incorporate changes to sectoral classifications, however its purpose remains as before – to aid local stakeholders in developing and monitoring local strategies over the future.

This report provides technical information on the EEFM's coverage, methodology and data sources. (The latest forecast results are presented separately, on the Cambridgeshire County Council 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, Neil Gibson and Helen McDermott) who have a long history in model-building and forecasting at both local and regional level. The team has remained unchanged over the history of the EEFM project and has built up a 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 an ABI / 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'
- Spring 2013 – 'EEFM 2013 release'

In addition, a number of alternative scenarios have been (or will be) generated using the Model to inform the development of the RES and RSS. The EEFM Model Steering Group has oversight of this process. An advantage of the Model is that it is sufficiently flexible to generate a variety of scenarios. At present, these have to be produced by Oxford Economics. But it is intended that representatives at Cambridgeshire County Council will be trained to use this capability in due course, and be able subsequently to produce scenarios independently.

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

The outputs released are available on the Cambridgeshire County Council website www.cambridgeshire.gov.uk/business/research/economylab/Economic+forecasts.htm. 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.

This report does not provide EEFM forecast results. These can be found on the Cambridgeshire County Council website. The detailed forecasts are set out there in Excel spreadsheets, accompanied by an Oxford Economics powerpoint report.

Please note that following on from the initial EEFM 2012 forecasts published in July 2012, a revised set of forecasts were published in August 2012 containing minor revisions to the outlook.

2: Description of the Model

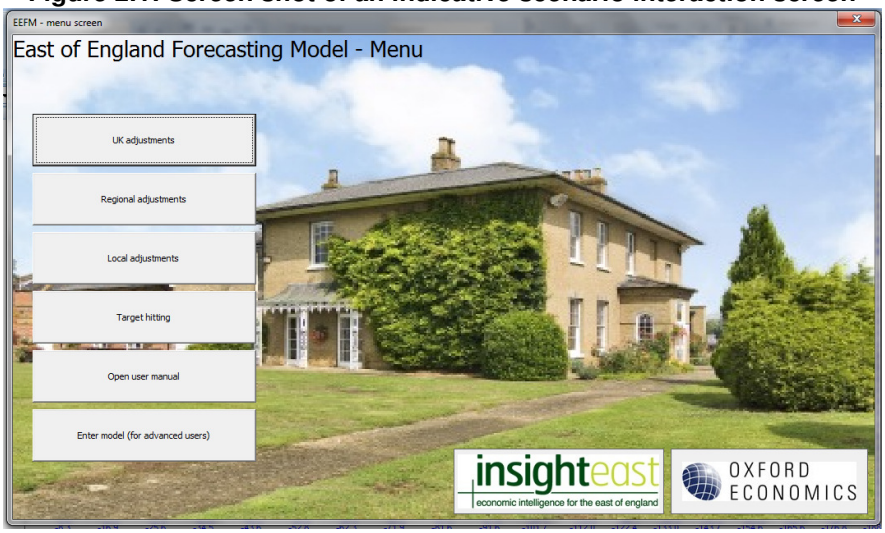
This chapter provides an overview of the East of England Forecasting Model (EEFM) and summarises its coverage and links to other Oxford Economics models. It also contains a list of the variables and geographies used. The forecasting methods and data sources are described in subsequent chapters.

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 though the Cambridgeshire County Council 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 151 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 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 2012 forecasts, that equates to 48 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 County Council 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 end dates of the Regional Economic Strategy and Regional Spatial Strategy review, as well as 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.

But for the Spring 2009 run, Cambridge was an exception

In the Spring 2009 forecasts, we assumed that a significant acceleration would occur in both population and employment in the financial and business services sectors in Cambridge. This reflected its designation as a regional growth area, and the potential release of large areas of land for residential development on the Marshall's airport site on the city's eastern flank. However, although some development is taking place around the city's edges the release of the Marshall's site has not happened. *So in the Autumn 2009 forecasts, we reverted to observed past trends as the sole basis for Cambridge forecasts, in line with the rest of the region*.

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 GVA, employment, population, etc, 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, sectors, etc. 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 (prior to 2010, defined as females aged 16-59 and males aged 16-64, but forecast to change in line with changes in the retirement age – e.g. in 2010 it is defined as all males aged 16-64 and females aged 16-59 and 56 days)
    - Young (defined as all persons aged 0-15)
    - Elderly (currently defined as females aged 60+ and males aged 65+ but forecast to change in line with changes in the retirement age)
  - 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, sic07 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 5 sectors (workplace-based)
  - Agriculture **(sic 01-03)**
  - Production **(sic 05-37, 41-43)**
  - Low skilled private services **(sic 38-39, 45-47, 55-56, 90-99)**
  - High skilled private services **(sic 49, 50-53, 58-84)**
  - Health & education **(sic 85-88)**
- Self-employed jobs by the 31 sectors above (workplace-based)
- Total employment (employee jobs plus self-employed jobs) by the 31 sectors above (workplace-based)
- Total number of people employed in an area (consistent with 2001 Census)
- Total number of an area's residents who are employed (consistent with 2001 Census)
- Employment rate of an area's residents (aged 16-74, consistent with 2001 Census)

- Net commuting (number of people employed in an area, minus the number of that area's residents who are employed)
- Unemployed (claimant and ILO)

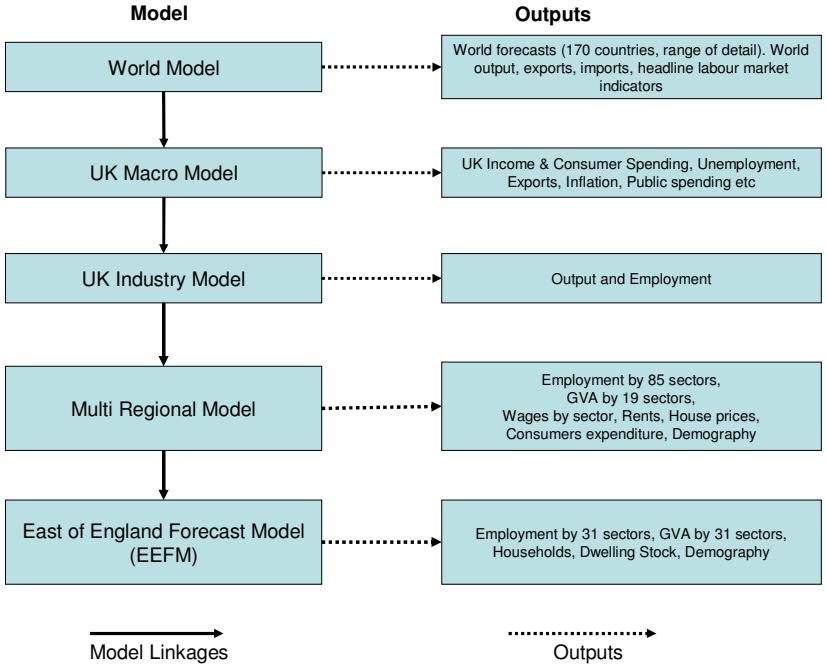
- **Output**
  - GVA (£m, workplace-based, 2003 prices for Spring 2009 forecasts, 2005 prices for Autumn 2009 and Spring 2010 forecasts, 2006 prices for Autumn 2010 forecasts, and 2008 prices for EEFM 2012 forecasts). Given for 31 sectors listed above (ownership of dwellings (imputed rents as defined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

- **Housing**
  - Households ('000s)
  - Demand for dwellings ('000s)

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



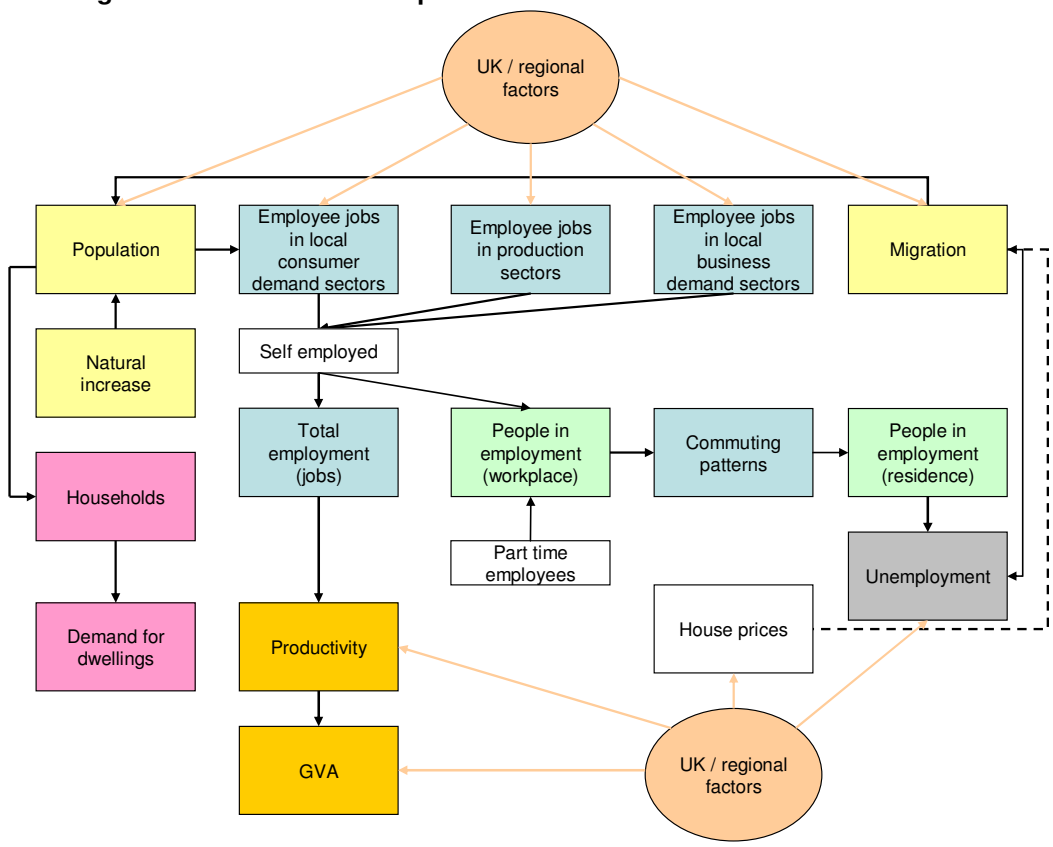
3: Model overview

The structure and data inputs of the Oxford Economics Regional Model, which underpins the EEFM, is not set out here. But it 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 encapsulated 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 pp 9-10. 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. And 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

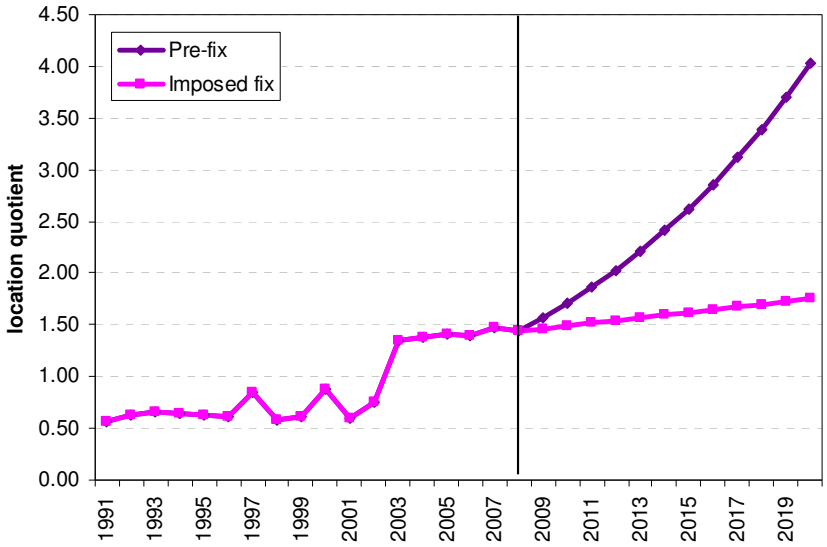
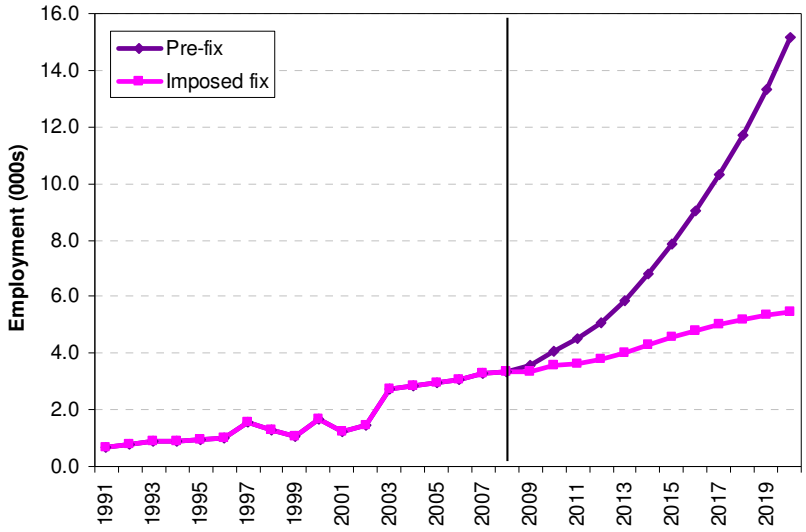


Figure 3.3 shows how these trends translate into actual jobs growth. It is clear that an uncritical acceptance of automated trends would have a substantial, implausible impact on longer-term employment forecasts for an area.

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 five 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 five sectors. (The five sectors are listed on p.10.)

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 2008-10 (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 Census gives 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.

In some cases, the 2001 ABI data is implausible. This is especially the case for Hertsmere but also for other districts in Hertfordshire where ABI 2001 figures appear to be inflated. It is also true for Forest Heath, East Cambridgeshire and Basildon where ABI 2001 figures are implausibly low. In these cases a scaling factor has been imposed that is closer to the regional average.

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 2001 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 2004-2010 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 employee 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 (2008).

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 of working age – that is females aged 16-59 and males aged 16-64 (although over the forecast period this varies as the retirement age changes)

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 GAD (2008-based) projections.

Note: in the Spring 2009 and Autumn 2009 EEFM forecasts, working age population equated to females aged 15-59 and males aged 15-64. However, in the Spring 2010 EEFM results the definition was changed where 15 year-olds are now counted in the 'Young Population' below.

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 GAD (2008-based) projections. The regional forecast for this variable is simply the sum of these local area forecasts.

Note: in the Spring 2009 and Autumn 2009 EEFM forecasts, the young population covered everyone aged 0-14. However, in the Spring 2010 EEFM results the definition was changed where 15 year-olds are now added to this group.

Elderly population

The total number of elderly people in a given area (defined as females aged 60+ and males aged 65+, although this definition alters over the forecast period as the retirement age changes)

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 to 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 set at its actual 2010 value of 10,100 people.

- 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*.

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

- previous year's population
- **multiplied by** [0.02 – (0.83 X previous year's 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 2% of last year's population if unemployment then was zero. Unemployment rates below 2.4% will result in net in-migration, whereas unemployment rates above 2.4% will lead to net out-migration. To illustrate with a worked example, in an area with 100,000 people and a 3% unemployment rate, net migration the following year will be 100,000 X [0.02 – (0.83 X 0.03)], or 100,000 X [0.02 – 0.0249], or 100,000 X -0.0049, or -490.

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 1991-2010 (from ONS) and implies a local employment rate trend consistent with that for the region as a whole.

In about a third of districts, this constant is zero. It tends to be positive (at a few hundred a year) in rural or coastal districts, and is negative for urban areas, especially in Hertfordshire and Essex. Areas with negative constants would experience a net loss of migrants unless unemployment there was low enough to induce sufficient net inflows of economic migrants.

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 (broken down by occupied and vacant dwelling stock). The methodology for forecasting households and dwellings has changed from that which was applied when the model was originally developed. The EEFM originally forecast household numbers 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 modified the process of forecasting these two variables, which is now 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 – 2009.

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 maintain current occupation ratios in the context of a higher population.

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.)

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 forecasts 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 2005-09 and the 2005-09 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 is assumed to be a function of population i.e. more people mean 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 divided 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 by local authority. Then we adjusted the forecasts based on scaling factors capturing the differences between our calculations between 2005-09 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 is assumed to be a function of GVA i.e. 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 divided 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 by local authority. Then we adjusted the forecasts based on scaling factors capturing the differences between our calculations between 2005-09 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 is 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, 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 2005-09, 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 2005-09, we projected the local authority LULUCF by taking the previous years 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 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 – 2010 Business Register and Employment Survey (BRES)
2011 – ONS Workforce Jobs (WFJ)

Latest data:
Regional and UK data: 2011
Local authority data: 2010

Next release:

Regional data:	BRES 2011 results, available September 2012
	ONS Workforce Jobs Q1 2012, available June 2012
Local authority data:	BRES 2010 results, available September 2012

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 2011 Q4.
- 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 2008-10. 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 2008-10. 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 2011 Q4. Using this, we are able to construct an annual series of employee jobs by sector for each region over the period 1981-2011 (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 2010 BRES data is projected forward for 2011 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 2010, with the level of employee jobs used in the EEFM for the East region in the same year. The percentage difference show the adjustment made which converts the BRES data to an annual average value.

Table 4.1: Employee jobs (incl. GST), WFJ and EEFM, 2010

	BRES, 2010 (000s)	EEFM 2010 (000s)	% difference
A : Agriculture	26.0	24.9	-4.3%
B : Mining & quarrying	1.3	1.3	-2.9%
C : Manufacturing	212.2	211.8	-0.2%
D : Electricity & gas supply	4.5	4.7	5.4%
E : Water supply, waste & remediation	17.6	17.2	-2.2%
F : Construction	110.2	111.7	1.4%
G : Wholesale	449.5	451.1	0.4%
H : Transportation & storage	108.8	108.4	-0.4%
I : Hotels & restaurants	138.8	137.2	-1.1%
J : Information & communications	61.9	60.8	-1.7%
K : Finance	61.5	61.8	0.6%
L : Real estate activities	46.0	47.0	2.3%
M : Professional, scientific & technical activities	160.8	162.2	0.9%
N : Administrative & support service activities	202.9	200.1	-1.4%
O : Public administration & defence	107.8	104.0	-3.5%
P : Education	244.3	237.9	-2.6%
Q : Health	283.5	289.0	2.0%
R : Arts & entertainment	57.1	55.7	-2.4%
S : Other service activities	52.8	53.0	0.3%
Total	**2347.3**	**2339.9**	**-0.3%**

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 2008-10 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 2009-11 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 2009-11.

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 1991-2010, 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 2010 and allows 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 0.9% adjustment to professional services in 2010 has been applied to the number of professional services jobs in each local authority in the East with no exceptions.

Note: for 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 2010 (000s)	EEFM adjusted 2010 (000s)	% difference
Agriculture	26.0	24.9	-4.3%
Mining and Quarrying	1.3	1.3	-2.9%
Food Manufacturing	29.5	28.2	-4.4%
General Manufacturing	54.8	56.6	3.3%
Chemicals excl. pharmaceuticals	26.8	27.4	2.4%
Pharmaceuticals	6.5	5.7	-11.4%
Metals manufacturing	25.8	26.4	2.1%
Transport equipment, machinery & equipment, etc	38.5	38.0	-1.5%
Electronics	30.2	29.5	-2.2%
Utilities	10.7	11.6	8.1%
Waste and remediation	11.4	10.4	-8.9%
Construction	110.0	111.7	1.6%
Wholesale	170.1	169.2	-0.6%
Retail	279.0	281.9	1.1%
Land Transport	103.4	103.3	-0.1%
Water and air transport	5.3	5.0	-6.0%
Hotels and restaurants	138.7	137.2	-1.1%
Publishing and broadcasting	11.9	13.5	13.2%
Telecoms	13.7	14.9	8.6%
Computer related activity	36.2	32.4	-10.4%
Finance	61.5	61.8	0.6%
Real Estate	46.0	47.0	2.3%
Professional services	137.3	138.6	0.9%
Research & development	23.5	23.6	0.7%
Business services	117.2	121.8	3.9%
Employment activities	85.6	78.3	-8.6%
Public administration	107.7	104.0	-3.4%
Education	244.0	237.9	-2.5%
Health and care	283.2	289.0	2.1%
Arts and entertainment	57.0	55.7	-2.3%
Other services	52.7	53.0	0.6%
Total	**2345.5**	**2339.9**	**-0.2%**

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 – 2010 Business Register and Employment Survey (BRES)

Latest data:
Regional data: 2010
Local authority data: 2010

Next release:
Regional data: BRES 2011 results available September 2012
Local authority data: BRES 2011 results available September 2012

The EEFM draws its data on full-time and part-time employees in employment from the BRES over the years 2008-10, 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 of the 5 sectors 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 for local area estimates

Latest data: Regional - 2011
Local authorities - 2010

Next release: Regional data: ONS Workforce Jobs Q1 2012, available June 2012
Local authorities: 2011 data available December 2012

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 2001 Census.

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 2011 Q4. 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 Census. 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.

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 2001 from the Census with the scaled series used in the EEFM. The latter is considerably higher than the Census series, by a margin of 7.1% at regional level. This is because census data is a count of people that are self employed, whereas the regional series used is jobs based. In general, urban areas show the biggest margins of difference.

Table 4.3: Comparison of self-employment data with EEFM data, 2001

	Census data (000s, 2001)	EEFM scaled data (000s, 2001)	Difference 2001
Babergh	6.6	7.0	6.2%
Basildon	9.8	10.6	8.1%
Bedford	8.4	9.1	7.8%
Braintree	9.4	10.0	6.4%
Breckland	8.0	8.4	5.0%
Brentwood	4.9	5.3	7.7%
Broadland	7.5	7.9	5.6%
Broxbourne	5.8	6.2	6.7%
Cambridge	6.8	7.5	10.0%
Castle Point	5.4	5.8	6.6%
Chelmsford	10.0	10.8	7.7%
Colchester	9.8	10.6	8.2%
Dacorum	9.6	10.3	8.1%
East Cambridgeshire	5.3	5.6	5.5%
East Hertfordshire	9.5	10.2	7.2%
Epping Forest	9.1	9.7	6.4%
Fenland	5.1	5.4	5.0%
Forest Heath	3.5	3.8	6.3%
Great Yarmouth	5.3	5.7	7.1%
Harlow	3.6	3.9	9.3%
Hertsmere	7.4	8.0	8.6%
Huntingdonshire	9.2	9.9	7.2%
Ipswich	6.0	6.5	8.4%
Kings Lynn and West Norfolk	9.1	9.5	4.8%
Luton	8.7	9.4	7.7%
Maldon	4.9	5.2	5.7%
Mid Bedfordshire	8.5	9.0	5.9%
Mid Suffolk	6.8	7.2	5.3%
North Hertfordshire	8.0	8.7	7.8%
North Norfolk	8.0	8.5	5.4%
Norwich	7.5	8.2	9.4%
Peterborough	7.5	8.2	9.4%
Rochford	5.1	5.4	6.6%
South Bedfordshire	6.9	7.4	8.0%
South Cambridgeshire	9.6	10.4	8.1%
South Norfolk	8.3	8.7	5.1%
Southend-on-Sea	9.8	10.7	8.5%
St Albans	9.2	10.0	8.1%
St Edmundsbury	6.5	7.0	6.8%
Stevenage	4.0	4.4	8.3%
Suffolk Coastal	8.1	8.6	6.3%
Tendring	8.4	8.9	6.0%
Three Rivers	5.6	5.9	6.3%
Thurrock	7.1	7.6	6.6%
Uttlesford	6.2	6.6	6.5%
Watford	5.5	6.0	9.2%
Waveney	6.3	6.7	6.3%
Welwyn Hatfield	5.6	6.1	7.9%
East of England	**347.6**	**372.4**	**7.1%**

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: 2011
Next release: 2012

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 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 2011, 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, 2011

	DASA data (000s, 2011)	EEFM scaled data (000s, 2011)	Difference
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	3.5	3.6	0.2
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	0.6	0.6	0.0
Ipswich	0.0	0.0	0.0
Kings Lynn and West Norfolk	2.7	2.9	0.1
Luton	0.0	0.0	0.0
Maldon	0.0	0.0	0.0
Mid Bedfordshire	1.6	1.7	0.1
Mid Suffolk	1.6	1.7	0.1
North Hertfordshire	0.0	0.0	0.0
North Norfolk	0.0	0.0	0.0
Norwich	0.0	0.0	0.0
Peterborough	1.5	1.6	0.1
Rochford	0.0	0.0	0.0
South Bedfordshire	0.0	0.0	0.0
South Cambridgeshire	1.6	1.7	0.1
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	1.9	0.1
Stevenage	0.0	0.0	0.0
Suffolk Coastal	0.7	0.7	0.0
Tendring	0.0	0.0	0.0
Three Rivers	1.1	1.1	0.1
Thurrock	0.0	0.0	0.0
Uttlesford	0.8	0.9	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	**18.1**	**19.0**	**0.9**

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
Regional : Nomis – Claimant count seasonally adjusted

Latest data: 2011

Next release: 2012, Spring 2013

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. The scaling ensures that the local area data sum to the East of England data in the Oxford Regional Model. And as the latter is seasonally adjusted, the scaling effectively seasonally adjusts the unadjusted local figures. The difference between the raw unemployment data and scaled series is minimal with only 460 claimants of a difference for the East region as a whole.

Table 4.5: Comparison of unemployment data with EEFM data, 2011

	NOMIS data (000s 2011)	EEFM scaled data (000s, 2011)	Difference (000s)
Babergh	1.17	1.16	0.00
Basildon	4.27	4.25	-0.02
Bedford	3.99	3.98	-0.02
Braintree	2.59	2.58	-0.01
Breckland	2.22	2.21	-0.01
Brentwood	0.97	0.97	0.00
Broadland	1.44	1.43	-0.01
Broxbourne	2.00	2.00	-0.01
Cambridge	1.72	1.72	-0.01
Castle Point	1.55	1.54	-0.01
Chelmsford	2.84	2.83	-0.01
Colchester	3.26	3.25	-0.01
Dacorum	2.41	2.40	-0.01
East Cambridgeshire	1.08	1.07	0.00
East Hertfordshire	1.69	1.68	-0.01
Epping Forest	2.18	2.17	-0.01
Fenland	2.09	2.08	-0.01
Forest Heath	0.86	0.86	0.00
Great Yarmouth	3.45	3.43	-0.01
Harlow	2.41	2.40	-0.01
Hertsmere	1.59	1.59	-0.01
Huntingdonshire	2.37	2.36	-0.01
Ipswich	4.01	4.00	-0.02
Kings Lynn and West Norfolk	2.69	2.67	-0.01
Luton	6.03	6.01	-0.02
Maldon	0.87	0.87	0.00
Mid Bedfordshire	1.72	1.71	-0.01
Mid Suffolk	1.15	1.14	0.00
North Hertfordshire	1.92	1.91	-0.01
North Norfolk	1.52	1.52	-0.01
Norwich	4.40	4.38	-0.02
Peterborough	5.40	5.38	-0.02
Rochford	1.09	1.08	0.00
South Bedfordshire	2.44	2.43	-0.01
South Cambridgeshire	1.27	1.27	-0.01
South Norfolk	1.53	1.52	-0.01
Southend-on-Sea	5.00	4.98	-0.02
St Albans	1.51	1.51	-0.01
St Edmundsbury	1.54	1.53	-0.01
Stevenage	2.13	2.12	-0.01
Suffolk Coastal	1.40	1.39	-0.01
Tendring	3.58	3.57	-0.01
Three Rivers	1.13	1.12	0.00
Thurrock	4.30	4.28	-0.02
Uttlesford	0.79	0.79	0.00
Watford	1.76	1.76	-0.01
Waveney	2.98	2.97	-0.01
Welwyn Hatfield	1.79	1.78	-0.01
East of England	**112.11**	**111.65**	**-0.46**

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
Annual Population Survey (APS)

Region: Census of Population
Annual Population Survey (APS)

Latest data: 2010

Next release: 2011, available July 2012

The residence employment data used in the EEFM is based on Census and APS data. The resident employment rate from the 2001 Census is the key variable used, and is extrapolated back to 1994 and forward to 2010 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 2001, 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, 2001

	Census 2001 (000s)	EEFM 2001 (000s)	Difference (000s)
Babergh	40.3	40.3	0.0
Basildon	77.7	77.7	0.0
Bedford	70.5	70.5	0.0
Braintree	66.1	66.1	0.0
Breckland	55.6	55.6	0.0
Brentwood	32.8	32.8	0.0
Broadland	58.0	58.0	0.0
Broxbourne	43.5	43.5	0.0
Cambridge	49.2	49.2	0.0
Castle Point	41.1	41.1	0.0
Chelmsford	80.2	80.2	0.0
Colchester	75.1	75.1	0.0
Dacorum	69.3	69.3	0.0
East Cambridgeshire	37.2	37.2	0.0
East Hertfordshire	67.5	67.5	0.0
Epping Forest	57.8	57.8	0.0
Fenland	37.7	37.7	0.0
Forest Heath	28.3	28.3	0.0
Great Yarmouth	37.5	37.5	0.0
Harlow	38.9	38.9	0.0
Hertsmere	46.0	46.0	0.0
Huntingdonshire	82.3	82.3	0.0
Ipswich	54.1	54.1	0.0
Kings Lynn and West Norfolk	60.2	60.2	0.0
Luton	82.3	82.3	0.0
Maldon	29.0	29.0	0.0
Mid Bedfordshire	63.8	63.8	0.0
Mid Suffolk	42.7	42.7	0.0
North Hertfordshire	58.8	58.8	0.0
North Norfolk	41.4	41.4	0.0
Norwich	53.6	53.6	0.0
Peterborough	73.3	73.3	0.0
Rochford	37.8	37.8	0.0
South Bedfordshire	57.3	57.3	0.0
South Cambridgeshire	69.1	69.1	0.0
South Norfolk	52.6	52.6	0.0
Southend-on-Sea	70.2	70.2	0.0
St Albans	65.7	65.7	0.0
St Edmundsbury	50.2	50.2	0.0
Stevenage	39.6	39.6	0.0
Suffolk Coastal	52.4	52.4	0.0
Tendring	53.6	53.6	0.0
Three Rivers	40.6	40.6	0.0
Thurrock	69.5	69.5	0.0
Uttlesford	35.0	35.0	0.0
Watford	41.7	41.7	0.0
Waveney	46.0	46.0	0.0
Welwyn Hatfield	46.1	46.1	0.0
East of England	**2,579.1**	**2,579.1**	**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 2010, 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. (But see also chapter 5, which explores other differences between the Census and APS/LFS resident employment rates in 2001.)

Table 4.7: Comparison of APS residence-based employment rate with EEFM data, 2010

	APS data (%, 2010)	EEFM scaled data (%, 2011)	Difference (pp)
Babergh	69.9	68.2	-1.7
Basildon	69.9	62.5	-7.4
Bedford	75.2	64.7	-10.5
Braintree	78.4	68.8	-9.6
Breckland	74.0	60.5	-13.5
Brentwood	79.8	69.0	-10.8
Broadland	74.5	66.0	-8.5
Broxbourne	70.5	62.7	-7.8
Cambridge	74.0	54.4	-19.6
Castle Point	72.4	58.0	-14.4
Chelmsford	75.4	66.4	-9.0
Colchester	72.9	58.0	-14.9
Dacorum	77.7	65.3	-12.4
East Cambridgeshire	81.3	68.1	-13.2
East Hertfordshire	79.6	67.7	-11.9
Epping Forest	68.6	60.3	-8.3
Fenland	66.5	54.6	-11.9
Forest Heath	76.3	65.3	-11.0
Great Yarmouth	67.9	51.6	-16.3
Harlow	72.5	65.3	-7.2
Hertsmere	75.1	69.4	-5.7
Huntingdonshire	74.1	65.0	-9.1
Ipswich	71.8	59.9	-11.9
Kings Lynn and West Norfolk	70.8	61.1	-9.7
Luton	68.3	55.3	-13.0
Maldon	70.6	65.0	-5.6
Mid Bedfordshire	79.8	68.4	-11.4
Mid Suffolk	79.2	65.6	-13.6
North Hertfordshire	76.8	63.0	-13.8
North Norfolk	71.5	51.8	-19.7
Norwich	70.7	61.4	-9.3
Peterborough	68.4	57.0	-11.4
Rochford	77.8	67.0	-10.8
South Bedfordshire	73.9	60.4	-13.5
South Cambridgeshire	77.9	70.3	-7.6
South Norfolk	72.6	66.3	-6.3
Southend-on-Sea	72.4	62.0	-10.4
St Albans	73.6	65.8	-7.8
St Edmundsbury	74.8	67.6	-7.2
Stevenage	80.2	65.1	-15.1
Suffolk Coastal	78.1	63.3	-14.8
Tendring	66.5	48.0	-18.5
Three Rivers	71.1	65.5	-5.6
Thurrock	70.7	61.3	-9.4
Uttlesford	76.9	70.0	-6.9
Watford	71.8	69.2	-2.6
Waveney	68.7	56.6	-12.1
Welwyn Hatfield	71.6	59.4	-12.2
East of England	**73.4**	**62.5**	**-10.9**

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: 2001

Next release: 2011 data available Summer 2012

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 2001 to ensure they are consistent with the Census.

Table 4.8: Comparison of Census employment data with EEFM data, 2001

	Census employment, (000's 2001)	EEFM data (000s, 2001)	Difference (%)
Babergh	32.2	32.2	0.0%
Basildon	76.7	76.7	0.0%
Bedford	68.4	68.4	0.0%
Braintree	50.5	50.5	0.0%
Breckland	45.3	45.3	0.0%
Brentwood	32.6	32.6	0.0%
Broadland	39.2	39.2	0.0%
Broxbourne	32.1	32.1	0.0%
Cambridge	78.7	78.7	0.0%
Castle Point	21.6	21.6	0.0%
Chelmsford	75.5	75.5	0.0%
Colchester	73.2	73.2	0.0%
Dacorum	68.5	68.5	0.0%
East Cambridgeshire	24.9	24.9	0.0%
East Hertfordshire	57.2	57.2	0.0%
Epping Forest	38.6	38.6	0.0%
Fenland	31.8	31.8	0.0%
Forest Heath	32.1	32.1	0.0%
Great Yarmouth	36.2	36.2	0.0%
Harlow	39.3	39.3	0.0%
Hertsmere	44.4	44.4	0.0%
Huntingdonshire	69.0	69.0	0.0%
Ipswich	65.9	65.9	0.0%
Kings Lynn and West Norfolk	56.4	56.4	0.0%
Luton	83.9	83.9	0.0%
Maldon	20.6	20.6	0.0%
Mid Bedfordshire	45.1	45.1	0.0%
Mid Suffolk	34.7	34.7	0.0%
North Hertfordshire	47.6	47.6	0.0%
North Norfolk	37.5	37.5	0.0%
Norwich	92.6	92.6	0.0%
Peterborough	90.6	90.6	0.0%
Rochford	22.9	22.9	0.0%
South Bedfordshire	44.3	44.3	0.0%
South Cambridgeshire	64.1	64.1	0.0%
South Norfolk	39.9	39.9	0.0%
Southend-on-Sea	63.3	63.3	0.0%
St Albans	55.7	55.7	0.0%
St Edmundsbury	50.3	50.3	0.0%
Stevenage	41.7	41.7	0.0%
Suffolk Coastal	48.0	48.0	0.0%
Tendring	41.2	41.2	0.0%
Three Rivers	30.6	30.6	0.0%
Thurrock	57.3	57.3	0.0%
Uttlesford	34.7	34.7	0.0%
Watford	49.4	49.4	0.0%
Waveney	42.5	42.5	0.0%
Welwyn Hatfield	54.6	54.6	0.0%
East of England	**2,383.1**	**2,383.1**	**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: 2001
Next release: 2011 data available Summer 2012

Net commuting flows in the EEFM are worked out by subtracting residence employment from total workplace employment (people). The net commuting flows for 2001 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, 2001

	Census net commuting, (000's 2001)	EEFM data (000s, 2001)	Difference (%)
Babergh	-8.0	-8.0	0.0%
Basildon	-1.0	-1.0	0.0%
Bedford	-2.1	-2.1	0.0%
Braintree	-15.6	-15.6	0.0%
Breckland	-10.3	-10.3	0.0%
Brentwood	-0.2	-0.2	0.0%
Broadland	-18.8	-18.8	0.0%
Broxbourne	-11.4	-11.4	0.0%
Cambridge	29.5	29.5	0.0%
Castle Point	-19.5	-19.5	0.0%
Chelmsford	-4.7	-4.7	0.0%
Colchester	-2.0	-2.0	0.0%
Dacorum	-0.8	-0.8	0.0%
East Cambridgeshire	-12.3	-12.3	0.0%
East Hertfordshire	-10.4	-10.4	0.0%
Epping Forest	-19.2	-19.2	0.0%
Fenland	-5.9	-5.9	0.0%
Forest Heath	3.9	3.9	0.0%
Great Yarmouth	-1.4	-1.4	0.0%
Harlow	0.5	0.5	0.0%
Hertsmere	-1.7	-1.7	0.0%
Huntingdonshire	-13.3	-13.3	0.0%
Ipswich	11.8	11.8	0.0%
Kings Lynn and West Norfolk	-3.8	-3.8	0.0%
Luton	1.6	1.6	0.0%
Maldon	-8.4	-8.4	0.0%
Mid Bedfordshire	-18.7	-18.7	0.0%
Mid Suffolk	-8.0	-8.0	0.0%
North Hertfordshire	-11.2	-11.2	0.0%
North Norfolk	-3.9	-3.9	0.0%
Norwich	39.0	39.0	0.0%
Peterborough	17.3	17.3	0.0%
Rochford	-14.9	-14.9	0.0%
South Bedfordshire	-13.0	-13.0	0.0%
South Cambridgeshire	-5.0	-5.0	0.0%
South Norfolk	-12.7	-12.7	0.0%
Southend-on-Sea	-6.9	-6.9	0.0%
St Albans	-10.0	-10.0	0.0%
St Edmundsbury	0.1	0.1	0.0%
Stevenage	2.2	2.2	0.0%
Suffolk Coastal	-4.4	-4.4	0.0%
Tendring	-12.4	-12.4	0.0%
Three Rivers	-9.9	-9.9	0.0%
Thurrock	-12.1	-12.1	0.0%
Uttlesford	-0.4	-0.4	0.0%
Watford	7.7	7.7	0.0%
Waveney	-3.6	-3.6	0.0%
Welwyn Hatfield	8.5	8.5	0.0%
East of England	**-196.0**	**-196.0**	**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: 2010
Next release: 2011, available summer 2012

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.

Table 4.10: Comparison of population data with EEFM data, 2010

	Mid Year Estimates (000's 2010)	EEFM data (000s, 2010)	Difference (%)
Babergh	85.6	85.6	0.0%
Basildon	175.2	175.2	0.0%
Bedford	160.8	160.8	0.0%
Braintree	144.0	144.0	0.0%
Breckland	130.9	130.9	0.0%
Brentwood	74.8	74.8	0.0%
Broadland	123.7	123.7	0.0%
Broxbourne	90.6	90.6	0.0%
Cambridge	125.7	125.7	0.0%
Castle Point	89.4	89.4	0.0%
Chelmsford	169.5	169.5	0.0%
Colchester	181.0	181.0	0.0%
Dacorum	142.9	142.9	0.0%
East Cambridgeshire	84.9	84.9	0.0%
East Hertfordshire	138.5	138.5	0.0%
Epping Forest	124.7	124.7	0.0%
Fenland	91.9	91.9	0.0%
Forest Heath	64.3	64.3	0.0%
Great Yarmouth	97.2	97.2	0.0%
Harlow	81.7	81.7	0.0%
Hertsmere	99.9	99.9	0.0%
Huntingdonshire	167.3	167.3	0.0%
Ipswich	128.3	128.3	0.0%
Kings Lynn and West Norfolk	143.6	143.6	0.0%
Luton	198.8	198.8	0.0%
Maldon	63.2	63.2	0.0%
Mid Bedfordshire	136.5	136.5	0.0%
Mid Suffolk	95.0	95.0	0.0%
North Hertfordshire	125.8	125.8	0.0%
North Norfolk	101.7	101.7	0.0%
Norwich	143.5	143.5	0.0%
Peterborough	173.4	173.4	0.0%
Rochford	83.4	83.4	0.0%
South Bedfordshire	118.8	118.8	0.0%
South Cambridgeshire	146.4	146.4	0.0%
South Norfolk	121.8	121.8	0.0%
Southend-on-Sea	165.3	165.3	0.0%
St Albans	138.8	138.8	0.0%
St Edmundsbury	104.5	104.5	0.0%
Stevenage	81.8	81.8	0.0%
Suffolk Coastal	124.3	124.3	0.0%
Tendring	148.5	148.5	0.0%
Three Rivers	88.9	88.9	0.0%
Thurrock	159.7	159.7	0.0%
Uttlesford	77.5	77.5	0.0%
Watford	86.0	86.0	0.0%
Waveney	117.5	117.5	0.0%
Welwyn Hatfield	114.4	114.4	0.0%
East of England	**5,831.9**	**5,831.8**	**0.0%**

Source: ONS, Oxford Economics

Working age population

Description: Prior to 2010 this was defined as male population aged 16-64 plus female population aged 16-59. Between 2010 and 2020, the state pension age for females is set to increase by 6 months every year, starting in April 2010 (that is the pension age of females will increase by one month for every two months of the year that passes). Consequently, the mid-year working age population estimate in 2010 (which is collected on 30th June of that year) reflects all males aged 16-64 plus females aged 16-59 plus 56 days. Over the forecast period, this definition will continue to change in line with the planned retirement age changes.

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

Latest data: 2010
Next release: 2011, available summer 2012

In previous EEFM runs, ONS's population local authority level mid-year estimates were used directly in the EEFM. In 2010, the definition of working age population has changed in line with the change to the retirement age for females (from 16-59 year olds to 16-59 plus 56 days). Regional data for 2010 is published and this is used directly in the EEFM for the region as a whole. However, local authority level data is not published on this basis. As such, Oxford Economics use local level working age population which is defined as all males aged 16-64 plus all females aged 16-59. These figures are then scaled up by a factor 0.2% which ensures that the local level data are consistent with the changed definition of working age females. This is shown in table 4.11 below.

Table 4.11: Comparison of working age population data with EEFM data, 2010

	Mid Year Estimates (000's 2010)	EEFM data (000s, 2010)	Difference (%)
Babergh	47.3	47.4	0.2%
Basildon	107.1	107.3	0.2%
Bedford	99.6	99.8	0.2%
Braintree	86.4	86.5	0.2%
Breckland	74.6	74.7	0.2%
Brentwood	44.7	44.8	0.2%
Broadland	70.7	70.8	0.2%
Broxbourne	54.8	54.9	0.2%
Cambridge	92.2	92.3	0.2%
Castle Point	50.8	50.9	0.2%
Chelmsford	105.2	105.4	0.2%
Colchester	116.0	116.2	0.2%
Dacorum	87.5	87.6	0.2%
East Cambridgeshire	50.5	50.6	0.2%
East Hertfordshire	85.4	85.5	0.2%
Epping Forest	75.0	75.1	0.2%
Fenland	52.7	52.8	0.2%
Forest Heath	39.4	39.5	0.2%
Great Yarmouth	56.3	56.4	0.2%
Harlow	50.8	50.9	0.2%
Hertsmere	60.7	60.8	0.2%
Huntingdonshire	102.2	102.4	0.2%
Ipswich	80.7	80.8	0.2%
Kings Lynn and West Norfolk	79.1	79.2	0.2%
Luton	126.0	126.2	0.2%
Maldon	36.8	36.9	0.2%
Mid Bedfordshire	85.3	85.4	0.2%
Mid Suffolk	54.7	54.8	0.2%
North Hertfordshire	75.8	75.9	0.2%
North Norfolk	52.4	52.5	0.2%
Norwich	99.7	99.9	0.2%
Peterborough	108.3	108.5	0.2%
Rochford	48.4	48.5	0.2%
South Bedfordshire	72.7	72.8	0.2%
South Cambridgeshire	88.3	88.4	0.2%
South Norfolk	68.9	69.0	0.2%
Southend-on-Sea	98.2	98.4	0.2%
St Albans	84.1	84.2	0.2%
St Edmundsbury	61.1	61.2	0.2%
Stevenage	51.4	51.5	0.2%
Suffolk Coastal	68.6	68.7	0.2%
Tendring	77.8	77.9	0.2%
Three Rivers	53.4	53.5	0.2%
Thurrock	100.8	101.0	0.2%
Uttlesford	45.6	45.7	0.2%
Watford	55.9	56.0	0.2%
Waveney	65.2	65.3	0.2%
Welwyn Hatfield	74.2	74.3	0.2%
East of England	**3,523.3**	**3,528.8**	**0.2%**

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: 2010

Next release: 2011, available summer 2012

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

In practice, young population for the East region in the Model is estimated as the residual between total population, working age population and elderly population. In previous runs, the

latter three variables matched the published source. 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).

In this recent EEFM update, the definition of working age population has changed in 2010 (due to changes in the state pension age). Data for this precise definition of working age people is only available at regional level, meaning that the local authority data must be scaled to be consistent with the new definition for working age and is therefore higher than the traditionally defined working age population data published at local authority level (see above for more details).

Since the young population is treated as a residual for the region in the EEFM, this means that East young population is subsequently lower than the published data. This, in turn, means that all local authorities young population levels will be lower than the published data.

In reality, given the differences come as a result of changes in the state pension age, it is the elderly population which should be lower (i.e. as the state pension age for females is higher, this means there are less females defined as 'elderly' as they are still considered to be of working age).

This is a known anomaly to Oxford Economics which will be corrected in the next update of the EEFM.

Elderly population

Description: Prior to 2010, elderly population data are defined as male population aged 65+ plus female population aged 60+. For 2010, the definition of working age population has changed to include all females aged 16-59 plus 56 days (see working age population above for further details). Consequently the definition of elderly population has changed to be all males aged 65 and over, plus females aged 60 plus 57 days and over. This will continue to change throughout the forecast period as the retirement age changes).

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

Latest data: 2010

Next release: 2011 available summer 2012

As noted above, the changes to the state pension age should – in reality – mean that elderly population is lower than the published data for local authorities. That is to say, given that the data

for this new precise definition of working age population is only published at regional level, all of the local authority data is converted to the new definition via scaling the data such that it becomes consistent with the regional levels.

In this latest EEFM update, the additional working age people have been taken out of the young population. In reality, this should be taken out of the elderly population and will be corrected in the next EEFM update.

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: 2010

Next release: 2011, available summer 2011

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 40 migrants in 2010 (though it was around 30 in 2008 and 280 in 2009). (The scaling process allocates these to local authorities in accordance with their share of the region's total population.)

Recent improvements to ONS' methodology for estimating international migrant flows across regions and local authorities has resulted in revised population estimates. However, these revisions have not yet been mainstreamed into the main published datasets. The EEFM methodology will incorporate these in the next update of the model when all data are available.

Table 4.12: Comparison of 'net migration and other changes' data with EEFM data, 2010

	Net migration and other changes (000's 2010)	EEFM data (000s, 2010)	Difference (000's)
Babergh	-0.07	-0.07	0.00
Basildon	0.24	0.24	0.00
Bedford	1.93	1.93	0.00
Braintree	0.72	0.72	0.00
Breckland	0.95	0.95	0.00
Brentwood	0.82	0.82	0.00
Broadland	0.83	0.83	0.00
Broxbourne	-0.14	-0.13	0.00
Cambridge	3.89	3.89	0.00
Castle Point	0.21	0.21	0.00
Chelmsford	1.03	1.04	0.00
Colchester	3.11	3.11	0.00
Dacorum	0.53	0.53	0.00
East Cambridgeshire	0.63	0.63	0.00
East Hertfordshire	0.75	0.75	0.00
Epping Forest	0.38	0.38	0.00
Fenland	0.18	0.18	0.00
Forest Heath	1.72	1.72	0.00
Great Yarmouth	0.85	0.85	0.00
Harlow	0.39	0.39	0.00
Hertsmere	0.63	0.63	0.00
Huntingdonshire	0.76	0.76	0.00
Ipswich	0.89	0.89	0.00
Kings Lynn and West Norfolk	0.58	0.58	0.00
Luton	2.33	2.33	0.00
Maldon	0.35	0.35	0.00
Mid Bedfordshire	1.00	1.00	0.00
Mid Suffolk	0.78	0.78	0.00
North Hertfordshire	0.74	0.74	0.00
North Norfolk	0.90	0.90	0.00
Norwich	2.60	2.60	0.00
Peterborough	0.56	0.56	0.00
Rochford	0.18	0.18	0.00
South Bedfordshire	0.13	0.13	0.00
South Cambridgeshire	1.16	1.16	0.00
South Norfolk	1.98	1.98	0.00
Southend-on-Sea	0.63	0.63	0.00
St Albans	0.69	0.69	0.00
St Edmundsbury	0.80	0.80	0.00
Stevenage	0.11	0.11	0.00
Suffolk Coastal	0.48	0.48	0.00
Tendring	1.19	1.19	0.00
Three Rivers	0.46	0.46	0.00
Thurrock	1.23	1.24	0.00
Uttlesford	1.64	1.64	0.00
Watford	1.47	1.47	0.00
Waveney	-0.04	-0.04	0.00
Welwyn Hatfield	1.03	1.03	0.00
East of England	**44.22**	**44.26**	**0.04**

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: 2010

Next release: 2011, available summer 2012

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 are *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" figures.

Table 4.13 shows that this is indeed the case, although the size of the differences is not exactly the same.

Table 4.13: Comparison of natural increase data with EEFM data, 2010

	Natural increase, (000's, 2010)	EEFM data (000s, 2010)	Difference (000s)
Babergh	-0.13	-0.14	0.00
Basildon	0.86	0.85	-0.01
Bedford	0.87	0.86	-0.01
Braintree	0.58	0.58	-0.01
Breckland	0.05	0.04	-0.01
Brentwood	0.18	0.18	0.00
Broadland	-0.13	-0.14	-0.01
Broxbourne	0.54	0.53	0.00
Cambridge	0.71	0.70	-0.01
Castle Point	-0.01	-0.02	0.00
Chelmsford	0.67	0.66	-0.01
Colchester	0.80	0.79	-0.01
Dacorum	0.77	0.76	-0.01
East Cambridgeshire	0.38	0.37	0.00
East Hertfordshire	0.65	0.64	-0.01
Epping Forest	0.32	0.31	-0.01
Fenland	0.03	0.02	0.00
Forest Heath	0.38	0.37	0.00
Great Yarmouth	0.05	0.04	0.00
Harlow	0.71	0.70	0.00
Hertsmere	0.37	0.36	-0.01
Huntingdonshire	0.75	0.74	-0.01
Ipswich	0.81	0.80	-0.01
Kings Lynn and West Norfolk	0.02	0.01	-0.01
Luton	2.17	2.16	-0.01
Maldon	-0.05	-0.05	0.00
Mid Bedfordshire	0.70	0.69	-0.01
Mid Suffolk	0.02	0.01	0.00
North Hertfordshire	0.36	0.35	-0.01
North Norfolk	-0.40	-0.40	-0.01
Norwich	0.80	0.79	-0.01
Peterborough	1.64	1.64	-0.01
Rochford	0.12	0.11	0.00
South Bedfordshire	0.57	0.56	-0.01
South Cambridgeshire	0.74	0.73	-0.01
South Norfolk	0.12	0.12	-0.01
Southend-on-Sea	0.47	0.46	-0.01
St Albans	0.91	0.90	-0.01
St Edmundsbury	0.20	0.20	-0.01
Stevenage	0.70	0.69	0.00
Suffolk Coastal	-0.28	-0.28	-0.01
Tendring	-0.69	-0.70	-0.01
Three Rivers	0.34	0.34	0.00
Thurrock	1.27	1.26	-0.01
Uttlesford	0.26	0.25	0.00
Watford	0.73	0.73	0.00
Waveney	-0.16	-0.17	-0.01
Welwyn Hatfield	0.57	0.57	-0.01
East of England	**21.28**	**20.99**	**-0.29**

Source: ONS, Oxford Economics

Output

GVA

Description: Gross Value Added in real 2008 prices
(Note: GVA data were rebased in the EEFM 2012 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: 2010 totals and 2009 sector data
Local authority data: 2009 totals and sector data

Next release: Regional data: 2011 totals and 2009 sector data available December 2012
Local authority data: 2010 totals and sector data available December 2012

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 2008 prices.)

Local authority GVA forecasts are obtained by multiplying forecast regional GVA per employee (aka '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 2008 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, 2008

	Regional Accounts 2008	EEFM 2008	Difference (%)
Peterborough	4,115	4,108	-0.2%
Cambridgeshire CC	13,526	13,486	-0.3%
Norfolk	13,852	13,880	0.2%
Suffolk	12,474	12515	0.3%
Luton	4,369	4,362	-0.2%
Bedfordshire CC	6,736	6,741	0.1%
Hertfordshire	26,109	26090	-0.1%
Southend-on-Sea	2,603	2,604	0.0%
Thurrock	2,399	2,407	0.3%
Essex CC	24,124	24,117	0.0%

Source: Regional Accounts, Oxford Economics

Housing

Demand for dwellings

Description: Stock of dwellings.

Data: Local authorities: DCLG – Housing Strategy Statistical Appendix Tables

Latest data: 2011
Next release: 2012, data due in 2013

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 *preserving the latest known occupation ratios*.

Table 4.15: Comparison of DCLG dwelling stock data with EEFM data, 2011

	DCLG data (000's 2011)	EEFM data (000s, 2011)	Difference (%)
Babergh	38.8	38.8	0.0%
Basildon	74.4	74.4	0.0%
Bedford	66.9	66.9	0.0%
Braintree	61.9	61.9	0.0%
Breckland	57.3	57.3	0.0%
Brentwood	31.5	31.5	0.0%
Broadland	54.7	54.7	0.0%
Broxbourne	39.2	39.2	0.0%
Cambridge	49.4	49.4	0.0%
Castle Point	37.5	37.5	0.0%
Chelmsford	74.3	74.3	0.0%
Colchester	75.4	75.4	0.0%
Dacorum	60.8	60.8	0.0%
East Cambridgeshire	35.6	35.6	0.0%
East Hertfordshire	58.4	58.4	0.0%
Epping Forest	54.2	54.2	0.0%
Fenland	42.6	42.6	0.0%
Forest Heath	28.2	28.2	0.0%
Great Yarmouth	46.3	46.3	0.0%
Harlow	35.7	35.7	0.0%
Hertsmere	41.1	41.1	0.0%
Huntingdonshire	72.2	72.2	0.0%
Ipswich	58.9	58.9	0.0%
Kings Lynn and West Norfolk	69.9	69.9	0.0%
Luton	77.0	77.0	0.0%
Maldon	27.1	27.1	0.0%
Mid Bedfordshire	56.8	56.8	0.0%
Mid Suffolk	41.6	41.6	0.0%
North Hertfordshire	55.2	55.2	0.0%
North Norfolk	52.5	52.5	0.0%
Norwich	63.7	63.7	0.0%
Peterborough	77.5	77.5	0.0%
Rochford	34.6	34.6	0.0%
South Bedfordshire	51.8	51.8	0.0%
South Cambridgeshire	61.4	61.4	0.0%
South Norfolk	54.7	54.7	0.0%
Southend-on-Sea	77.0	77.0	0.0%
St Albans	58.0	58.0	0.0%
St Edmundsbury	46.7	46.7	0.0%
Stevenage	35.5	35.5	0.0%
Suffolk Coastal	58.1	58.1	0.0%
Tendring	67.3	67.3	0.0%
Three Rivers	36.1	36.1	0.0%
Thurrock	64.2	64.2	0.0%
Uttlesford	32.5	32.5	0.0%
Watford	36.9	36.9	0.0%
Waveney	54.7	54.7	0.0%
Welwyn Hatfield	45.6	45.6	0.0%
East of England	**2,531.6**	**2,531.6**	**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: 2010
Next release: 2011, available 2012

Data on house prices by local authority is taken from DCLG and incorporated into in 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, 2010

	DCLG data (£000's 2010)	EEFM data (£000s, 2010)	Difference (%)
Babergh	245.9	245.9	0.0%
Basildon	225.5	225.5	0.0%
Bedford	218.0	218.0	0.0%
Braintree	221.6	221.6	0.0%
Breckland	185.1	185.1	0.0%
Brentwood	347.7	347.7	0.0%
Broadland	203.9	203.9	0.0%
Broxbourne	251.0	251.0	0.0%
Cambridge	321.2	321.2	0.0%
Castle Point	215.1	215.1	0.0%
Chelmsford	260.0	260.0	0.0%
Colchester	205.8	205.8	0.0%
Dacorum	317.3	317.3	0.0%
East Cambridgeshire	215.7	215.7	0.0%
East Hertfordshire	309.1	309.1	0.0%
Epping Forest	351.8	351.8	0.0%
Fenland	144.2	144.2	0.0%
Forest Heath	178.7	178.7	0.0%
Great Yarmouth	149.4	149.4	0.0%
Harlow	188.0	188.0	0.0%
Hertsmere	373.7	373.7	0.0%
Huntingdonshire	209.2	209.2	0.0%
Ipswich	148.9	148.9	0.0%
Kings Lynn and West Norfolk	185.6	185.6	0.0%
Luton	160.4	160.4	0.0%
Maldon	244.6	244.6	0.0%
Mid Bedfordshire	239.2	239.2	0.0%
Mid Suffolk	224.0	224.0	0.0%
North Hertfordshire	268.6	268.6	0.0%
North Norfolk	211.3	211.3	0.0%
Norwich	167.1	167.1	0.0%
Peterborough	155.8	155.8	0.0%
Rochford	245.0	245.0	0.0%
South Bedfordshire	208.1	208.1	0.0%
South Cambridgeshire	275.1	275.1	0.0%
South Norfolk	212.8	212.8	0.0%
Southend-on-Sea	211.1	211.1	0.0%
St Albans	420.4	420.4	0.0%
St Edmundsbury	213.2	213.2	0.0%
Stevenage	186.9	186.9	0.0%
Suffolk Coastal	250.4	250.4	0.0%
Tendring	175.4	175.4	0.0%
Three Rivers	393.2	393.2	0.0%
Thurrock	181.8	181.8	0.0%
Uttlesford	336.0	336.0	0.0%
Watford	249.6	249.6	0.0%
Waveney	175.0	175.0	0.0%
Welwyn Hatfield	318.9	318.9	0.0%
East of England	**237.7**	**237.7**	**0.0%**

Source: DCLG, Oxford Economics

Number of households

Description: Households

Data: Estimated by Oxford Economics

Latest data: 2011
Next release: 2012, data due in 2013

Table 4.17 shows the difference between the most recent DCLG household estimates (2008 based) by local authority, and the household data used in EEFM. At regional level, the series only differ by 0.9%, although the differences can be somewhat greater for individual local authorities.

Table 4.17: Comparison of DCLG household estimates with EEFM data, 2008

	DCLG data (000's 2008)	EEFM data (000s, 2008)	Difference (%)
Babergh	36.6	36.8	0.5%
Basildon	74.0	71.9	-2.9%
Bedford	64.9	63.1	-2.9%
Braintree	59.8	59.4	-0.7%
Breckland	55.2	53.4	-3.3%
Brentwood	30.3	30.3	-0.2%
Broadland	52.8	52.5	-0.5%
Broxbourne	36.4	37.4	2.5%
Cambridge	44.6	45.8	2.5%
Castle Point	37.1	36.2	-2.5%
Chelmsford	69.5	68.5	-1.5%
Colchester	71.7	70.8	-1.3%
Dacorum	58.2	58.5	0.6%
East Cambridgeshire	33.8	32.5	-3.8%
East Hertfordshire	56.0	55.8	-0.4%
Epping Forest	52.3	52.0	-0.5%
Fenland	39.5	40.3	1.9%
Forest Heath	25.0	25.9	3.9%
Great Yarmouth	42.4	43.6	2.9%
Harlow	34.5	34.4	-0.3%
Hertsmere	39.5	39.6	0.3%
Huntingdonshire	68.6	67.5	-1.6%
Ipswich	55.1	54.9	-0.4%
Kings Lynn and West Norfolk	62.1	62.8	1.1%
Luton	73.2	74.1	1.2%
Maldon	26.2	25.5	-3.0%
Mid Bedfordshire	55.3	53.5	-3.3%
Mid Suffolk	39.2	38.7	-1.1%
North Hertfordshire	52.8	52.6	-0.4%
North Norfolk	46.0	46.6	1.2%
Norwich	61.7	56.5	-8.4%
Peterborough	72.3	71.3	-1.3%
Rochford	34.3	33.4	-2.7%
South Bedfordshire	48.6	49.5	1.9%
South Cambridgeshire	58.1	57.4	-1.1%
South Norfolk	50.4	50.2	-0.3%
Southend-on-Sea	73.6	72.6	-1.4%
St Albans	55.6	55.6	0.1%
St Edmundsbury	43.7	44.7	2.3%
Stevenage	34.0	34.2	0.5%
Suffolk Coastal	54.2	53.2	-1.9%
Tendring	66.2	63.2	-4.5%
Three Rivers	35.4	35.2	-0.7%
Thurrock	64.5	62.6	-2.9%
Uttlesford	30.0	29.1	-2.7%
Watford	33.7	34.5	2.5%
Waveney	52.0	50.9	-2.1%
Welwyn Hatfield	44.6	44.1	-1.1%
East of England	**2,405.8**	**2,383.3**	**-0.9%**

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: 2009
Next release: 2010, data due in 2013

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, 2009

	DECC data (k tonnes 2009)	EEFM data (k tonnes, 2009)	Difference (%)
Babergh	204.8	204.8	0.0%
Basildon	385.4	385.4	0.0%
Bedford	321.9	321.9	0.0%
Braintree	245.2	245.2	0.0%
Breckland	293.8	293.8	0.0%
Brentwood	137.7	137.7	0.0%
Broadland	385.5	385.5	0.0%
Broxbourne	165.5	165.5	0.0%
Cambridge	398.1	398.1	0.0%
Castle Point	89.2	89.2	0.0%
Chelmsford	316.9	316.9	0.0%
Colchester	293.2	293.2	0.0%
Dacorum	235.5	235.5	0.0%
East Cambridgeshire	196.9	196.9	0.0%
East Hertfordshire	282.5	282.5	0.0%
Epping Forest	214.5	214.5	0.0%
Fenland	437.3	437.3	0.0%
Forest Heath	180.6	180.6	0.0%
Great Yarmouth	154.5	154.5	0.0%
Harlow	318.5	318.5	0.0%
Hertsmere	230.7	230.7	0.0%
Huntingdonshire	471.3	471.3	0.0%
Ipswich	252.6	252.6	0.0%
Kings Lynn and West Norfolk	868.4	868.4	0.0%
Luton	365.5	365.5	0.0%
Maldon	122.8	122.8	0.0%
Mid Bedfordshire	251.0	251.0	0.0%
Mid Suffolk	228.7	228.7	0.0%
North Hertfordshire	248.8	248.8	0.0%
North Norfolk	217.5	217.5	0.0%
Norwich	362.8	362.8	0.0%
Peterborough	459.1	459.1	0.0%
Rochford	108.1	108.1	0.0%
South Bedfordshire	226.5	226.5	0.0%
South Cambridgeshire	449.0	449.0	0.0%
South Norfolk	249.0	249.0	0.0%
Southend-on-Sea	271.6	271.6	0.0%
St Albans	223.8	223.8	0.0%
St Edmundsbury	884.5	884.5	0.0%
Stevenage	226.7	226.7	0.0%
Suffolk Coastal	243.1	243.1	0.0%
Tendring	188.4	188.4	0.0%
Three Rivers	129.0	129.0	0.0%
Thurrock	625.3	625.3	0.0%
Uttlesford	209.8	209.8	0.0%
Watford	216.8	216.8	0.0%
Waveney	279.6	279.6	0.0%
Welwyn Hatfield	302.1	302.1	0.0%
East of England	**14,169.5**	**14,169.5**	**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: 2009
Next release: 2010, data due in 2013

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, 2009

	DECC data (k tonnes 2009)	EEFM data (k tonnes, 2009)	Difference (%)
Babergh	193.6	193.6	0.0%
Basildon	351.1	351.1	0.0%
Bedford	310.4	310.4	0.0%
Braintree	299.0	299.0	0.0%
Breckland	271.7	271.7	0.0%
Brentwood	177.8	177.8	0.0%
Broadland	261.8	261.8	0.0%
Broxbourne	187.9	187.9	0.0%
Cambridge	215.1	215.1	0.0%
Castle Point	196.1	196.1	0.0%
Chelmsford	354.5	354.5	0.0%
Colchester	343.5	343.5	0.0%
Dacorum	308.5	308.5	0.0%
East Cambridgeshire	170.2	170.2	0.0%
East Hertfordshire	299.9	299.9	0.0%
Epping Forest	298.0	298.0	0.0%
Fenland	201.2	201.2	0.0%
Forest Heath	135.9	135.9	0.0%
Great Yarmouth	201.5	201.5	0.0%
Harlow	155.1	155.1	0.0%
Hertsmere	227.2	227.2	0.0%
Huntingdonshire	350.7	350.7	0.0%
Ipswich	244.2	244.2	0.0%
Kings Lynn and West Norfolk	340.9	340.9	0.0%
Luton	357.3	357.3	0.0%
Maldon	142.0	142.0	0.0%
Mid Bedfordshire	272.7	272.7	0.0%
Mid Suffolk	208.7	208.7	0.0%
North Hertfordshire	268.3	268.3	0.0%
North Norfolk	250.1	250.1	0.0%
Norwich	242.6	242.6	0.0%
Peterborough	342.6	342.6	0.0%
Rochford	181.6	181.6	0.0%
South Bedfordshire	249.0	249.0	0.0%
South Cambridgeshire	313.4	313.4	0.0%
South Norfolk	269.7	269.7	0.0%
Southend-on-Sea	380.2	380.2	0.0%
St Albans	315.0	315.0	0.0%
St Edmundsbury	219.4	219.4	0.0%
Stevenage	154.7	154.7	0.0%
Suffolk Coastal	285.1	285.1	0.0%
Tendring	303.5	303.5	0.0%
Three Rivers	204.3	204.3	0.0%
Thurrock	293.9	293.9	0.0%
Uttlesford	173.8	173.8	0.0%
Watford	176.2	176.2	0.0%
Waveney	236.1	236.1	0.0%
Welwyn Hatfield	224.5	224.5	0.0%
East of England	**12,160.3**	**12,160.3**	**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: 2009
Next release: 2010, data due in 2013

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, 2009

	DECC data (k tonnes 2009)	EEFM data (k tonnes, 2009)	Difference (%)
Babergh	231.7	231.7	0.0%
Basildon	283.1	283.1	0.0%
Bedford	264.0	264.0	0.0%
Braintree	363.9	363.9	0.0%
Breckland	389.1	389.1	0.0%
Brentwood	277.6	277.6	0.0%
Broadland	217.2	217.2	0.0%
Broxbourne	116.3	116.3	0.0%
Cambridge	104.2	104.2	0.0%
Castle Point	105.6	105.6	0.0%
Chelmsford	374.8	374.8	0.0%
Colchester	340.1	340.1	0.0%
Dacorum	280.0	280.0	0.0%
East Cambridgeshire	242.4	242.4	0.0%
East Hertfordshire	288.7	288.7	0.0%
Epping Forest	629.3	629.3	0.0%
Fenland	177.9	177.9	0.0%
Forest Heath	181.1	181.1	0.0%
Great Yarmouth	118.6	118.6	0.0%
Harlow	101.8	101.8	0.0%
Hertsmere	349.5	349.5	0.0%
Huntingdonshire	703.5	703.5	0.0%
Ipswich	118.7	118.7	0.0%
Kings Lynn and West Norfolk	390.8	390.8	0.0%
Luton	185.5	185.5	0.0%
Maldon	98.5	98.5	0.0%
Mid Bedfordshire	396.3	396.3	0.0%
Mid Suffolk	252.5	252.5	0.0%
North Hertfordshire	298.4	298.4	0.0%
North Norfolk	209.3	209.3	0.0%
Norwich	123.1	123.1	0.0%
Peterborough	414.3	414.3	0.0%
Rochford	99.7	99.7	0.0%
South Bedfordshire	308.2	308.2	0.0%
South Cambridgeshire	604.7	604.7	0.0%
South Norfolk	383.3	383.3	0.0%
Southend-on-Sea	151.7	151.7	0.0%
St Albans	496.0	496.0	0.0%
St Edmundsbury	255.2	255.2	0.0%
Stevenage	124.1	124.1	0.0%
Suffolk Coastal	267.8	267.8	0.0%
Tendring	233.7	233.7	0.0%
Three Rivers	304.0	304.0	0.0%
Thurrock	418.4	418.4	0.0%
Uttlesford	450.5	450.5	0.0%
Watford	97.1	97.1	0.0%
Waveney	142.9	142.9	0.0%
Welwyn Hatfield	264.5	264.5	0.0%
East of England	**13,229.2**	**13,229.2**	**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: 2009
Next release: 2010, data due in 2013

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, 2009

	DECC data (k tonnes 2009)	EEFM data (k tonnes, 2009)	Difference (%)
Babergh	-3.6	-3.6	0.0%
Basildon	-0.2	-0.2	0.0%
Bedford	4.3	4.3	0.0%
Braintree	-7.7	-7.7	0.0%
Breckland	-44.9	-44.9	0.0%
Brentwood	0.1	0.1	0.0%
Broadland	-7.2	-7.2	0.0%
Broxbourne	-1.0	-1.0	0.0%
Cambridge	0.0	0.0	0.0%
Castle Point	0.2	0.2	0.0%
Chelmsford	-3.6	-3.6	0.0%
Colchester	-3.2	-3.2	0.0%
Dacorum	1.5	1.5	0.0%
East Cambridgeshire	152.6	152.6	0.0%
East Hertfordshire	-5.7	-5.7	0.0%
Epping Forest	-1.7	-1.7	0.0%
Fenland	144.3	144.3	0.0%
Forest Heath	31.8	31.8	0.0%
Great Yarmouth	0.9	0.9	0.0%
Harlow	-0.2	-0.2	0.0%
Hertsmere	0.6	0.6	0.0%
Huntingdonshire	120.3	120.3	0.0%
Ipswich	0.2	0.2	0.0%
Kings Lynn and West Norfolk	158.4	158.4	0.0%
Luton	0.3	0.3	0.0%
Maldon	-0.5	-0.5	0.0%
Mid Bedfordshire	2.3	2.3	0.0%
Mid Suffolk	-1.8	-1.8	0.0%
North Hertfordshire	-0.7	-0.7	0.0%
North Norfolk	-12.5	-12.5	0.0%
Norwich	-0.3	-0.3	0.0%
Peterborough	3.3	3.3	0.0%
Rochford	1.9	1.9	0.0%
South Bedfordshire	0.8	0.8	0.0%
South Cambridgeshire	12.0	12.0	0.0%
South Norfolk	-8.1	-8.1	0.0%
Southend-on-Sea	0.6	0.6	0.0%
St Albans	0.2	0.2	0.0%
St Edmundsbury	-7.2	-7.2	0.0%
Stevenage	-0.2	-0.2	0.0%
Suffolk Coastal	-21.3	-21.3	0.0%
Tendring	0.2	0.2	0.0%
Three Rivers	0.5	0.5	0.0%
Thurrock	-0.4	-0.4	0.0%
Uttlesford	-8.4	-8.4	0.0%
Watford	0.2	0.2	0.0%
Waveney	-3.0	-3.0	0.0%
Welwyn Hatfield	-2.3	-2.3	0.0%
East of England	**491.9**	**491.9**	**0.0%**

Source: DECC, Oxford Economics

Total emissions

Description: Total CO2 emissions

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

Latest data: 2009
Next release: 2010, data due in 2013

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, 2009

	DECC data (k tonnes 2009)	EEFM data (k tonnes, 2009)	Difference (%)
Babergh	626.5	626.5	0.0%
Basildon	1,019.5	1,019.5	0.0%
Bedford	900.5	900.5	0.0%
Braintree	900.3	900.3	0.0%
Breckland	909.7	909.7	0.0%
Brentwood	593.1	593.1	0.0%
Broadland	857.3	857.3	0.0%
Broxbourne	468.6	468.6	0.0%
Cambridge	717.4	717.4	0.0%
Castle Point	391.1	391.1	0.0%
Chelmsford	1,042.6	1,042.6	0.0%
Colchester	973.6	973.6	0.0%
Dacorum	825.5	825.5	0.0%
East Cambridgeshire	762.1	762.1	0.0%
East Hertfordshire	865.4	865.4	0.0%
Epping Forest	1,140.0	1,140.0	0.0%
Fenland	960.7	960.7	0.0%
Forest Heath	529.4	529.4	0.0%
Great Yarmouth	475.5	475.5	0.0%
Harlow	575.1	575.1	0.0%
Hertsmere	808.0	808.0	0.0%
Huntingdonshire	1,645.7	1,645.7	0.0%
Ipswich	615.6	615.6	0.0%
Kings Lynn and West Norfolk	1,758.5	1,758.5	0.0%
Luton	908.6	908.6	0.0%
Maldon	362.7	362.7	0.0%
Mid Bedfordshire	922.4	922.4	0.0%
Mid Suffolk	688.0	688.0	0.0%
North Hertfordshire	814.8	814.8	0.0%
North Norfolk	664.5	664.5	0.0%
Norwich	728.1	728.1	0.0%
Peterborough	1,219.3	1,219.3	0.0%
Rochford	391.3	391.3	0.0%
South Bedfordshire	784.5	784.5	0.0%
South Cambridgeshire	1,379.1	1,379.1	0.0%
South Norfolk	893.9	893.9	0.0%
Southend-on-Sea	804.1	804.1	0.0%
St Albans	1,035.0	1,035.0	0.0%
St Edmundsbury	1,352.0	1,352.0	0.0%
Stevenage	505.3	505.3	0.0%
Suffolk Coastal	774.6	774.6	0.0%
Tendring	725.8	725.8	0.0%
Three Rivers	637.8	637.8	0.0%
Thurrock	1,337.2	1,337.2	0.0%
Uttlesford	825.7	825.7	0.0%
Watford	490.2	490.2	0.0%
Waveney	655.6	655.6	0.0%
Welwyn Hatfield	788.8	788.8	0.0%
East of England	**40,050.9**	**40,050.9**	**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 2010 and was released in December 2011. 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 consultees 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 2011 where data 'spikes' occurred in 2010 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 2010 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 2010 BRES data used in setting forecasts

Local authority	Sector	Correction
Mid Bedfordshire	*Public administration*	*Down by approximately 1,000 employee jobs*
Mid Bedfordshire	*Education*	*Down by approximately 1,000 employee jobs*
South Bedfordshire	*Public administration*	*Down by approximately 200 employee jobs*
Breckland	Employment activities	Up by approximately 500 employee jobs
Breckland	Arts & entertainment	Up by approximately 200 employee jobs
Broadland	Professional services	Up by approximately 500 employee jobs
Broadland	Business services	Up by approximately 400 employee jobs
Broadland	Arts & entertainment	Up by approximately 300 employee jobs
Chelmsford	Publishing & broadcasting	Up by approximately 200 employee jobs
Chelmsford	Business services	Up by approximately 700 employee jobs
Chelmsford	Arts & entertainment	Up by approximately 200 employee jobs
Fenland	Education	Up by approximately 1,100 employee jobs
Fenland	Health & care	Up by approximately 800 employee jobs
Forest Heath	Retail	Up by approximately 300 employee jobs
Ipswich	Utilities	Down by approximately 200 employee jobs
Ipswich	Retail	Up by approximately 400 employee jobs
Ipswich	Professional services	Up by approximately 600 employee jobs

Ipswich	Business services	Up by approximately 400 employee jobs
Ipswich	Public administration	Down by approximately 300 employee jobs
Ipswich	Health & care	Up by approximately 800 employee jobs
Ipswich	Other services	Up by approximately 300 employee jobs
King's Lynn & West Norfolk	General Manufacturing	Up by approximately 300 employee jobs
King's Lynn & West Norfolk	Construction	Up by approximately 300 employee jobs
King's Lynn & West Norfolk	Land Transport	Up by approximately 300 employee jobs
King's Lynn & West Norfolk	Employment activities	Down by approximately 1,200 employee jobs
King's Lynn & West Norfolk	Health & care	Up by approximately 1,200 employee jobs
Mid Suffolk	Business services	Up by approximately 200 employee jobs
Watford	Construction	Up by approximately 900 employee jobs
Watford	Computer related activity	Up by approximately 400 employee jobs
Watford	Finance	Up by approximately 200 employee jobs
Watford	Real estate	Down by approximately 200 employee jobs
Watford	Professional services	Down by approximately 1,300 employee jobs
Watford	Public administration	Down by approximately 400 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 2011 adjusted value also includes an element of the trend employee growth that would have occurred if the correction had not been made

New information on outliers in the BRES data series is coming to our attention all the time: Table 5.2 lists a number of instances which we were only made aware of after this run of the EEFM, but which will be taken account of in the next run.

Table 5.2: Known BRES outlier corrections to be made in next EEFM run

Local authority	Sector	Expected correction
n/a	n/a	n/a

Use of Local Intelligence

In Chapter 3, we indicated that well-evidenced local intelligence would be used to make additional manual adjustments to forecast trends in employment growth. Between the Spring 2009 and Autumn 2009 run, feedback from local authorities resulted in additional adjustments to the EEFM for specified sectors in North Hertfordshire and Mid Suffolk. Since then, no new intelligence has been provided.

Table 5.3: Local Intelligence taken into account in EEFM Spring 2012 run

Local authority	Sector	Adjustment
n/a	n/a	n/a

Census vs LFS employment rates

EEFM uses resident employment rates which are anchored to the 2001 Census, 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, for 2001, there are significant differences between these two data sources. Table 5.4 shows, for all authorities, the 2001 resident employment rates from the Census and the LFS. Percentage point differences are shown in the third column. Note that, for consistency, the denominator in both cases is population of males aged 16-64 and females aged 16-59.

No clear reason for these differences has been found. There does not appear to be a consistent pattern to them. Cambridge shows the biggest difference, with an LFS employment rate 13.9 percentage points higher than the Census rate. 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; other areas with a substantial student population, such as Norwich, do not exhibit the same differences.

In the Model, resident employment rates are estimated as equal to the Census rate in 2001 (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 5.4: Census vs LFS employment rates

	Census 2001	LFS / APS 2001	Difference (pp)
Babergh	81.2	71.9	-9.3
Basildon	76.3	74.2	-2.1
Bedford	76.8	77.0	0.2
Braintree	80.9	78.5	-2.4
Breckland	78.2	79.0	0.9
Brentwood	80.3	78.8	-1.6
Broadland	82.1	78.3	-3.8
Broxbourne	80.7	79.4	-1.3
Cambridge	64.4	78.3	13.9
Castle Point	78.3	82.6	4.4
Chelmsford	81.0	79.9	-1.1
Colchester	76.5	82.3	5.8
Dacorum	81.6	80.9	-0.7
East Cambridgeshire	82.9	84.4	1.4
East Hertfordshire	82.7	82.7	0.0
Epping Forest	78.6	75.9	-2.7
Fenland	77.2	80.0	2.8
Forest Heath	82.0	83.6	1.6
Great Yarmouth	70.8	76.9	6.1
Harlow	80.2	77.7	-2.4
Hertsmere	80.3	74.8	-5.5
Huntingdonshire	83.2	82.6	-0.6
Ipswich	77.0	80.1	3.1
Kings Lynn and West Norfolk	77.4	72.7	-4.6
Luton	71.5	75.1	3.6
Maldon	79.4	74.9	-4.5
Mid Bedfordshire	83.3	82.6	-0.7
Mid Suffolk	81.9	81.8	-0.1
North Hertfordshire	82.3	84.6	2.3
North Norfolk	76.6	84.8	8.2
Norwich	69.2	69.8	0.5
Peterborough	76.2	79.5	3.2
Rochford	80.3	74.4	-5.9
South Bedfordshire	82.0	87.1	5.2
South Cambridgeshire	84.7	81.8	-2.9
South Norfolk	80.4	76.8	-3.5
Southend-on-Sea	75.0	73.2	-1.8
St Albans	81.8	78.6	-3.1
St Edmundsbury	82.8	78.2	-4.6
Stevenage	80.7	82.9	2.2
Suffolk Coastal	79.9	79.0	-0.9
Tendring	72.9	82.0	9.2
Three Rivers	81.0	76.6	-4.4
Thurrock	77.3	79.3	2.0
Uttlesford	82.4	79.3	-3.1
Watford	81.5	76.8	-4.8
Waveney	73.0	73.2	0.2
Welwyn Hatfield	77.7	80.4	2.7
Eastern	**78.5**	**78.7**	**0.1**

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 the last EEFM run in Autumn 2010, and includes comparison tables of each of the Model runs.

What's changed

Since the last EEFM update was in Autumn 2010, new data has been released for every variable in the model. Table 6.1 summarises the changes to the key data assumed for 2010 and 2011 (some arise from new data releases, some from updated estimates/forecasts, others from a mixture of the two).

Table 6.1: Changes to East of England data between the EEFM Autumn 2010 and EEFM 2012 runs

	Autumn 2010 EEFM		EEFM 2012		Differences	
	2010	2011	2010	2011	2010	2011
Population (000s)	5815	5860	5832	5895	17	35
Employment (000s)	2824	2821	2808	2844	-16	23
Resident employment (000s)	2659	2656	2644	2663	-15	7
Resident employment rate (%)	63.1	62.5	62.5	62.3	-0.6	-0.2
Unemployment (000s)	109.6	110.9	111.1	111.7	1.5	0.7
GVA (% growth)	2.9	2.1	1.7	1.3	-1.1	-0.8
Dwellings (000s)	2521	2546	2513	2532	-8	-14
Households (000s)	2438	2462	2430	2448	-8	-14

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

New data has been released for population in 2010 resulting in an upward revision of 17,000 people. This was due to a higher level of migration than estimated in the Autumn 2010 run and as a result we have raised our migration assumption for the East in the forecast and as a consequence population is also higher by 35,000 people in 2011.

In these EEFM 2012 forecasts, the level of **total employment** (the sum of employee jobs and self-employment jobs) in the East of England in 2010 is lower by 16,000 jobs than the equivalent figure in the Autumn 2010 forecasts. This is largely due to lower than expected data as published in the BRES which was then adjusted from a September based figure to an annual average figure in line with the ONS Workforce Jobs (WFJ) series. In 2011, we take the growth rates in each sector in the East and apply this to the adjusted 2010 BRES data to give a robust picture of sectoral change in the region in 2011. Consequently, total employment is higher than the Autumn 2010 estimate by 23,000 jobs in 2011.

The sector definitions used in the EEFM 2012 have changed since the Autumn 2010 model run to take into account the changes to the standard industrial classification (SIC 2007). As such, direct sectoral comparisons cannot be drawn between the two model runs.

In the EEFM 2012 run, the latest data available for **resident employment** was for 2010; the 2011 value for resident employment was an estimate based on the workplace employment data then available. These data come from the Annual Population Survey and the time period ideally used would be a four-quarter average of the quarters in a calendar year. The level of resident employment in the East in 2010 is lower than the Autumn 2010 estimate by 15,000 employees, and in 2011, resident employment is expected to be higher by 7,000 employees compared with the Autumn 2010 estimate. Both of these revisions remain in line with the changes in workplace based employment in the East.

Claimant unemployment data for all of 2010 is now available for the East (in Autumn 2010, we only had the first 9 months of data), showing that unemployment is 1,500 claimants higher than estimated in Autumn 2010 run. Furthermore, all 12 months of data was available for 2011, showing that unemployment was higher by 700 people compared with the previous run.

GVA data in the EEFM 2012 run has been rebased from 2006 prices to 2008 prices, preserving consistency with the Blue Book. In addition, new data regional data (total GVA in 2010, and sectoral GVA for 2009) has been released since the Autumn 2010 run. Although not shown in table 6.1, the latest GVA data suggests that the East economy contracted by 5.2% in 2009, compared with a 3.7% contraction estimated in the Autumn 2010 run. It is worth noting that at the time of publishing the previous run, GVA data for the East region for 2009 was not available. As such, the size of contraction was estimated based on labour market data which appeared to be extremely favourable for the East region. This latest estimate is based on published GVA data from Regional Accounts. In 2010, GVA growth in the East was more subdued than expected in the previous run with 1.7% growth compared with 2.9% previously. This is consistent with the wider UK which also endured lower than expected growth and largely reflects the impacts of public spending cuts. For similar reasons, GVA growth in 2011 is also expected to be slower than anticipated in the Autumn 2010 run when we forecast growth of 2.1% for the East, although this is now lower at 1.3% growth. In additional to public spending cuts, the struggling Eurozone is also a key factor in the sluggish economic growth.

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, the data for which is of course currently unavailable!

Population

Table 6.2 shows population growth over 2008-2013 in the Autumn 2007, Autumn 2008, Spring 2009, Autumn 2009, Spring 2010, Autumn 2010 and EEFM 2012 runs. The new 2010 population data released in June 2011 was higher than previously estimated due to higher migration. As such, the long term migration assumption was raised resulting in stronger growth in population in the medium term. The current EEFM 2012 forecasts are for an additional 296,400 people in the East over 2008-13. This compares with 228,900 in the Autumn 2010 run, and 210,200 additional people in Spring 2010 reflecting how our medium-term population projections have actually been fairly consistent throughout the lifetime of the EEFM (except in Autumn 2008).

The spread of the forecast change varies across districts but is guided by the direction of change in the 2010 population figure published for each district. Luton enjoyed the highest upward revision of 8,400 people whilst Broadland suffered the biggest reduction.

Note: in November 2011, the ONS released new indicative population estimates resulting from improvements to its international migration methodology. These revisions will impact upon population data over the period 2006-10, but the revisions will not be fully published until 2013 and therefore have not been incorporated in the recent EEFM run.

Table 6.2: Comparison of projected population growth 2008-2013 ('000s)

	Aut 07 2008-13 (000s)	Aut 08 2008-13 (000s)	Spr 09 2008-13 (000s)	Aut 09 2008-13 (000s)	Spr 10 2008-13 (000s)	Aut 10 2008-13 (000s)	EEFM 2012 2008-13 (000s)	Outturn 2008-13 (000s)
Babergh	2.3	4.2	4.0	3.4	3.1	2.7	0.5	-
Basildon	3.8	6.2	4.3	4.1	3.7	4.1	5.4	-
Bedford	7.3	7.8	6.7	5.5	5.8	4.9	8.0	-
Braintree	8.0	6.3	5.0	4.8	4.7	4.0	5.4	-
Breckland	5.5	6.4	5.9	4.8	4.9	5.0	6.6	-
Brentwood	3.9	2.6	1.1	1.8	1.7	3.1	5.2	-
Broadland	3.5	9.0	8.1	8.7	8.6	7.8	4.3	-
Broxbourne	1.8	3.8	2.6	2.9	3.2	3.3	2.2	-
Cambridge	5.6	14.0	12.3	11.2	10.3	12.3	15.2	-
Castle Point	1.9	2.4	1.3	1.0	0.8	0.6	2.0	-
Chelmsford	4.6	8.5	7.0	8.0	7.4	9.2	10.2	-
Colchester	6.0	9.2	8.8	8.6	6.7	8.7	15.9	-
Dacorum	4.3	5.4	4.3	5.9	5.8	6.7	6.1	-
East Cambridgeshire	4.6	5.2	4.4	4.0	3.1	4.9	7.4	-
East Hertfordshire	6.9	5.3	4.0	7.2	8.2	8.4	7.9	-
Epping Forest	3.4	4.4	2.3	2.9	2.9	3.4	3.2	-
Fenland	3.7	4.5	3.7	2.8	2.4	1.9	3.3	-
Forest Heath	1.6	3.6	3.4	3.2	3.2	4.4	6.6	-
Great Yarmouth	2.0	1.0	0.3	0.3	-0.3	0.0	1.5	-
Harlow	2.8	1.7	1.0	0.9	0.9	0.9	3.2	-
Hertsmere	2.9	4.8	2.8	3.5	3.5	3.6	5.5	-
Huntingdonshire	4.4	10.8	9.2	9.8	9.6	8.7	6.3	-
Ipswich	4.1	4.7	4.2	3.3	3.1	4.1	6.8	-
Kings Lynn and West Norfolk	1.8	5.6	4.8	5.6	5.1	4.8	4.0	-
Luton	4.5	3.2	1.9	3.3	4.0	5.8	14.2	-
Maldon	1.7	2.2	1.9	2.3	2.3	3.2	2.2	-
Mid Bedfordshire	8.2	7.5	6.8	6.5	6.7	5.9	8.8	-
Mid Suffolk	4.2	3.3	3.4	5.3	4.7	5.0	5.7	-
North Hertfordshire	5.4	9.3	4.6	4.9	4.4	5.0	6.4	-
North Norfolk	4.0	1.7	1.3	0.8	0.6	0.0	2.0	-
Norwich	3.8	8.0	7.1	7.7	6.5	9.1	14.8	-
Peterborough	5.7	4.3	2.5	2.1	2.3	2.7	6.8	-
Rochford	1.6	2.9	2.3	3.2	3.0	2.5	2.9	-
South Bedfordshire	4.0	8.1	5.4	5.2	4.9	4.6	3.6	-
South Cambridgeshire	9.0	9.9	8.6	11.8	11.0	12.7	12.7	-
South Norfolk	4.2	7.2	6.5	7.2	6.9	7.8	10.4	-
Southend-on-Sea	0.7	8.0	5.9	5.3	5.0	4.1	3.6	-
St Albans	5.8	6.8	5.9	8.9	8.1	10.0	9.2	-
St Edmundsbury	3.1	6.3	5.8	5.5	5.6	5.5	4.3	-
Stevenage	5.4	1.8	0.8	2.0	1.8	1.5	2.4	-
Suffolk Coastal	0.3	7.3	5.9	6.7	5.6	4.6	5.1	-
Tendring	4.2	6.3	5.0	3.6	2.6	2.1	4.8	-
Three Rivers	1.6	3.3	2.7	3.7	3.5	3.7	4.5	-
Thurrock	9.4	7.9	6.6	5.7	5.4	6.4	10.0	-
Uttlesford	3.6	2.5	2.2	2.5	2.6	3.1	5.8	-
Watford	3.3	3.6	0.6	1.7	1.3	2.4	6.0	-
Waveney	3.2	0.3	0.7	-0.4	-0.6	-0.6	-1.1	-
Welwyn Hatfield	4.1	5.3	5.2	4.4	4.1	4.5	8.5	-
Eastern	**197.4**	**264.7**	**210.7**	**223.9**	**210.2**	**228.9**	**296.4**	-

Source: Oxford Economics

Employment

Table 6.3 shows five-year forecasts for jobs growth over 2008-13 in the Autumn 2007, Autumn 2008, Spring 2009, Autumn 2009, Spring 2010, Autumn 2010 and EEFM 2012 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, recent 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. Whilst jobs growth remains positive over the period 2008-13 in the EEFM 2012, it is lower than estimated in the Autumn 2010. There are three factors which have led to this downward revision:

- Data revisions to the ONS Workforce Jobs and BRES series suggests that the contraction in jobs levels during the recession was more severe than originally anticipated. We now estimate that the East suffered 58,300 jobs losses over the period 2008-10 compared with 15,100 losses estimated in the Autumn 2010 in the same period.
- The continued impact of the public spending cuts will continue to act as a drag on jobs growth.
- With its proximity and strong trade linkages with the Eurozone, the UK is expected to continue to endure sluggish growth as the so-called export led recovery is not anticipated to pick up until at least 2013.

Despite slower jobs growth compared with the Autumn 2010 run, only two areas are expected to endure a contraction in jobs levels over the period 2008-13 - Broxbourne and Thurrock. The pace of recovery in each 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.

GVA

Table 6.4 shows five-year forecasts for GVA growth over 2008-13 in the Autumn 2007, Autumn 2008, Spring 2009, Autumn 2009, Spring 2010, Autumn 2010 and EEFM 2012 runs. As with employment, the five-year forecasts became more negative as the recession gathered pace, but in the Autumn 2009 run they improved reflecting the better-than-expected performance of the labour market. Despite a downward revision to medium term GVA growth in the Spring 2010 run, we had brought our estimates back up again in the Autumn 2010 run. For the same reasons as the more subdued jobs growth, our latest medium term outlook for GVA growth is more subdued than it was in the Autumn 2010. Indeed, GVA in 2009 is now estimated to have contracted by 5.2% according to newly published data, whereas in Autumn 2010, GVA was estimated to have contracted by 3.7% in line with favourable employment growth. We now expect GVA growth over the period 2008-13 to be 0.4% per annum, lower than that estimated in any previous EEFM run.

Table 6.3: Comparison of employment growth between EEFM updates, 2008-2013 ('000s)

	Aut 07 2008-13 (000s)	Aut 08 2008-13 (000s)	Spr 09 2008-13 (000s)	Aut 09 2008-13 (000s)	Spr 10 2008-13 (000s)	Aut 10 2008-13 (000s)	EEFM 2012 2008-13 (000s)	Outturn 2008-13 (000s)
Babergh	1.6	1.7	0.0	0.2	-0.1	0.6	-0.9	s
Basildon	1.0	0.7	-4.1	-1.4	-1.9	-1.2	-5.5	-
Bedford	3.1	1.6	-2.2	-2.0	-0.1	0.1	-3.9	-
Braintree	5.6	1.2	-2.9	-2.1	-0.8	-0.5	-3.5	-
Breckland	3.2	2.8	0.4	-0.3	0.1	1.3	-0.5	-
Brentwood	3.3	1.2	-2.3	-1.4	-0.7	1.3	-3.0	-
Broadland	1.9	2.2	-1.1	-0.8	0.5	1.4	8.8	-
Broxbourne	0.7	0.9	-1.6	-1.6	-0.5	-0.6	-0.3	-
Cambridge	3.9	10.6	8.0	10.1	6.9	8.9	2.4	-
Castle Point	1.2	0.5	-1.1	-0.8	-0.3	-0.3	0.2	-
Chelmsford	4.4	3.5	-0.7	0.9	0.6	2.5	6.7	-
Colchester	4.1	3.0	-1.0	1.3	1.2	2.6	6.4	-
Dacorum	4.7	1.1	-2.9	-0.5	0.0	1.6	-0.9	-
East Cambridgeshire	3.1	1.2	-0.6	0.2	0.6	2.2	2.9	-
East Hertfordshire	4.9	-0.6	-3.4	-1.9	-0.4	0.9	-4.0	-
Epping Forest	3.4	0.6	-2.5	-2.6	-0.3	1.1	4.4	-
Fenland	2.3	1.4	-0.1	0.0	2.2	2.9	1.6	-
Forest Heath	0.6	1.3	-0.3	0.0	0.5	1.3	2.2	-
Great Yarmouth	2.4	-1.1	-2.7	-1.8	-1.2	-0.8	0.7	-
Harlow	0.4	0.4	-2.4	-1.4	-4.6	-4.6	-4.0	-
Hertsmere	4.1	3.8	0.4	1.6	1.8	3.0	-3.2	-
Huntingdonshire	2.2	2.3	-2.0	-1.0	-1.1	-0.3	-2.3	-
Ipswich	0.7	1.6	-1.0	-1.1	-0.4	0.2	-0.9	-
Kings Lynn and West Norfolk	0.9	0.7	-2.3	-0.1	-0.5	1.1	-1.6	-
Luton	2.6	0.7	-3.7	-2.9	2.9	3.5	2.6	-
Maldon	0.8	0.7	-0.3	0.3	1.1	1.6	-0.2	-
Mid Bedfordshire	6.6	2.0	-0.7	0.3	0.9	1.6	7.0	-
Mid Suffolk	1.6	0.2	-1.6	1.1	0.9	2.3	1.7	-
North Hertfordshire	4.4	3.4	-0.6	-1.1	-1.2	-0.3	-1.4	-
North Norfolk	2.4	-0.7	-2.0	-1.0	-0.3	0.1	0.9	-
Norwich	2.0	0.8	-4.2	-3.1	-4.2	-3.5	-6.9	-
Peterborough	4.0	-1.4	-6.4	-6.3	-0.3	0.5	-2.4	-
Rochford	1.9	0.3	-0.9	-0.3	-0.2	0.0	-0.1	-
South Bedfordshire	2.5	2.2	-2.0	-1.4	-0.9	-0.6	1.1	-
South Cambridgeshire	5.5	2.5	-2.2	3.0	1.0	3.3	5.5	-
South Norfolk	2.5	2.9	0.3	2.0	2.9	4.8	7.8	-
Southend-on-Sea	1.3	2.3	-2.5	-1.3	-3.0	-3.0	-6.4	-
St Albans	5.2	3.2	-0.9	1.8	-4.9	-3.9	-1.1	-
St Edmundsbury	1.9	2.5	-0.3	-0.1	0.8	1.3	5.9	-
Stevenage	4.4	2.6	-0.8	1.2	1.6	1.9	2.9	-
Suffolk Coastal	1.7	2.4	-0.9	0.1	1.9	3.2	0.7	-
Tendring	2.1	1.0	-1.4	-0.7	-0.2	0.0	-0.1	-
Three Rivers	1.2	0.9	-0.8	0.3	0.5	1.4	-2.5	-
Thurrock	3.4	2.6	-0.2	-0.3	0.9	-0.5	4.5	-
Uttlesford	3.2	0.1	-0.9	-0.4	0.1	0.7	0.4	-
Watford	1.6	0.5	-4.1	-3.0	-1.0	0.9	1.2	-
Waveney	1.6	-1.7	-2.5	-2.0	-1.1	-1.0	-1.4	-
Welwyn Hatfield	5.0	1.2	-1.9	-1.3	0.4	1.7	4.2	-
Eastern	**133.2**	**73.7**	**-69.7**	**-21.9**	**0.1**	**41.1**	**25.8**	-

Source: Oxford Economics

Table 6.4: Comparison of GVA growth per annum between EEFM updates, 2008-2013 ('000s)

	Aut 07 2008-13 (avg % pa)	Aut 08 2008-13 (avg % pa)	Spr 09 2008-13 (avg % pa)	Aut 09 2008-13 (avg % pa)	Spr 10 2008-13 (avg % pa)	Aut 10 2008-13 (avg % pa)	EEFM 2012 2008-13 (avg % pa)	Outturn 2008-13 (avg % pa)
Babergh	3.0	3.0	1.2	1.4	0.9	1.1	-0.7	-
Basildon	2.8	2.9	1.2	1.6	0.9	1.2	-1.6	-
Bedford	2.7	2.4	0.8	0.8	1.1	1.3	-0.3	-
Braintree	3.9	2.6	0.7	1.0	0.6	0.9	-0.3	-
Breckland	3.3	2.9	1.5	1.5	1.4	1.8	0.0	-
Brentwood	3.9	3.4	1.2	1.4	1.0	1.9	-2.7	-
Broadland	2.9	3.1	0.8	1.5	1.7	1.9	4.6	-
Broxbourne	2.3	2.8	0.8	0.9	1.1	1.2	1.6	-
Cambridge	2.9	4.3	3.4	3.4	3.4	3.7	-0.6	-
Castle Point	3.1	2.5	0.5	0.8	1.6	1.8	0.5	-
Chelmsford	3.0	3.1	1.7	1.9	0.8	1.3	1.5	-
Colchester	3.1	3.2	1.4	1.9	1.1	1.5	1.9	-
Dacorum	3.2	2.7	0.7	1.1	0.5	1.1	0.5	-
East Cambridgeshire	4.3	3.0	0.7	1.4	1.3	2.1	2.8	-
East Hertfordshire	3.4	2.4	0.6	1.0	1.4	1.7	-0.1	-
Epping Forest	3.1	2.1	0.4	0.3	0.8	1.4	0.3	-
Fenland	3.1	2.9	1.5	1.5	2.3	2.6	2.2	-
Forest Heath	2.5	2.7	1.5	1.5	0.9	1.5	1.6	-
Great Yarmouth	3.5	1.8	0.5	0.7	0.7	1.1	1.0	-
Harlow	2.3	2.7	1.0	1.2	-1.7	-1.5	-4.6	-
Hertsmere	3.3	4.0	1.8	2.1	2.5	3.0	0.9	-
Huntingdonshire	2.7	2.7	1.0	1.3	1.1	1.4	0.9	-
Ipswich	2.0	2.8	1.6	1.5	1.1	1.3	-0.7	-
Kings Lynn and West Norfolk	2.5	2.3	0.9	1.5	0.7	1.0	0.9	-
Luton	3.1	2.7	1.1	1.0	2.0	2.2	0.0	-
Maldon	2.9	2.7	1.6	1.7	1.8	2.2	1.8	-
Mid Bedfordshire	4.3	2.8	1.2	1.5	0.8	1.1	3.6	-
Mid Suffolk	2.8	2.1	0.5	1.8	1.6	2.2	0.3	-
North Hertfordshire	3.4	3.5	1.6	1.4	0.9	1.3	2.6	-
North Norfolk	3.3	1.7	0.2	0.9	1.0	1.1	0.7	-
Norwich	1.9	2.9	1.4	1.7	0.4	0.7	-2.6	-
Peterborough	2.6	2.3	0.8	0.9	1.3	1.4	0.3	-
Rochford	3.5	2.6	1.4	1.6	0.2	0.4	-1.8	-
South Bedfordshire	3.1	3.1	0.7	0.8	-0.8	-0.5	0.5	-
South Cambridgeshire	3.9	3.3	1.3	2.4	1.3	2.1	1.8	-
South Norfolk	3.3	3.0	1.4	2.1	2.8	3.2	3.6	-
Southend-on-Sea	2.3	2.7	0.7	1.1	0.2	0.4	-1.6	-
St Albans	3.3	3.5	1.8	2.2	1.3	1.6	0.1	-
St Edmundsbury	2.6	2.7	1.1	1.4	2.0	2.2	4.3	-
Stevenage	4.4	4.0	2.2	2.4	2.1	2.5	2.2	-
Suffolk Coastal	2.4	3.1	0.9	0.8	1.4	1.9	-0.2	-
Tendring	3.3	2.3	0.8	0.9	0.8	1.1	-0.3	-
Three Rivers	2.9	2.9	1.6	2.1	1.3	1.8	-1.1	-
Thurrock	2.5	2.9	1.5	1.1	1.0	1.0	-0.3	-
Uttlesford	4.2	2.6	1.5	1.2	1.5	1.9	-0.3	-
Watford	2.2	2.9	0.2	0.6	1.9	2.6	-2.0	-
Waveney	3.0	1.5	0.4	0.7	0.9	1.1	0.4	-
Welwyn Hatfield	3.6	2.9	1.3	1.2	1.1	1.6	-0.2	-
Eastern	**3.0**	**2.9**	**1.2**	**1.4**	**1.2**	**1.6**	**0.4**	-

Source: Oxford Economics

Monitoring the long-term forecasts

This section includes table 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 have 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 6.5: Comparison of population growth per annum between EEFM updates, 2011-2031 ('000s)

	Aut 07 2011-31 (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)
Babergh	8.5	14.8	11.8	12.9	12.8	13.8	7.5
Basildon	10.6	20.3	12.7	14.1	14.0	13.6	19.2
Bedford	27.8	31.4	21.8	23.8	22.4	16.5	25.7
Braintree	30.0	20.7	14.9	15.3	14.6	12.7	21.3
Breckland	22.2	18.5	13.4	17.0	18.2	16.5	25.6
Brentwood	12.1	13.2	6.2	5.2	4.8	6.5	7.9
Broadland	14.7	32.1	30.7	31.1	31.0	30.4	15.3
Broxbourne	4.0	15.4	10.5	12.1	12.8	13.4	11.0
Cambridge	20.6	59.0	57.7	33.9	32.0	37.2	27.0
Castle Point	6.1	7.4	2.9	3.5	2.2	2.3	10.0
Chelmsford	14.3	27.3	21.8	23.9	22.0	25.2	34.0
Colchester	20.0	29.2	21.5	22.5	18.4	15.7	30.5
Dacorum	16.5	25.1	20.9	19.9	18.7	19.0	15.6
East Cambridgeshire	17.6	24.4	24.6	21.4	16.3	23.0	28.0
East Hertfordshire	22.9	29.6	28.4	31.7	31.7	31.8	25.0
Epping Forest	9.5	16.4	11.4	13.9	11.7	13.0	13.1
Fenland	16.7	11.4	7.4	11.0	11.8	10.0	21.3
Forest Heath	6.3	12.0	5.8	5.9	6.6	6.4	13.7
Great Yarmouth	13.1	12.4	6.4	7.5	7.0	6.4	12.5
Harlow	11.6	12.7	6.6	7.7	6.7	3.7	12.8
Hertsmere	9.0	21.1	11.7	11.5	10.6	12.2	13.1
Huntingdonshire	12.1	40.5	33.5	30.9	27.7	27.0	23.2
Ipswich	21.4	22.4	16.0	16.9	15.3	13.0	25.4
Kings Lynn and West Norfolk	10.3	15.2	10.5	25.4	30.3	27.8	22.5
Luton	20.1	8.4	-6.6	9.8	17.3	12.9	37.8
Maldon	5.5	10.2	7.8	8.4	7.9	8.6	8.7
Mid Bedfordshire	33.5	37.1	34.8	29.8	29.9	31.8	40.6
Mid Suffolk	17.2	10.9	7.9	18.5	17.2	19.4	21.3
North Hertfordshire	18.8	42.8	16.3	16.1	16.0	17.8	22.2
North Norfolk	17.8	4.0	1.9	2.2	3.2	3.3	12.3
Norwich	19.2	28.0	17.0	17.9	19.7	15.2	31.9
Peterborough	24.8	17.1	11.5	14.9	12.7	10.7	32.6
Rochford	6.1	6.0	2.2	6.2	4.7	4.7	11.0
South Bedfordshire	14.2	32.4	14.3	16.2	19.0	18.2	17.1
South Cambridgeshire	32.7	47.2	46.9	39.9	39.5	48.9	43.0
South Norfolk	16.3	28.9	26.9	29.2	29.5	30.9	31.7
Southend-on-Sea	4.2	25.3	14.7	16.3	17.0	14.8	9.4
St Albans	17.6	34.8	30.3	23.9	23.3	28.5	25.3
St Edmundsbury	11.3	24.4	20.8	20.7	19.1	18.7	13.8
Stevenage	22.2	13.1	9.1	10.2	10.7	10.3	10.0
Suffolk Coastal	1.8	25.8	18.9	20.5	19.1	20.0	26.0
Tendring	17.4	32.8	20.4	20.4	19.7	12.5	28.0
Three Rivers	3.4	14.4	10.7	9.2	8.5	11.9	10.8
Thurrock	39.2	33.1	22.5	25.9	23.0	21.1	39.7
Uttlesford	11.6	9.0	12.4	11.3	9.5	11.2	9.4
Watford	10.5	19.3	6.9	5.1	4.1	8.4	12.6
Waveney	15.8	4.4	5.2	5.9	6.1	4.2	8.3
Welwyn Hatfield	14.1	28.5	24.0	17.5	19.2	23.1	25.9
Eastern	**753.3**	**1070.4**	**786.1**	**815.3**	**796.0**	**803.9**	**990.7**

Source: Oxford Economics

Table 6.6: Comparison of employment growth per annum between EEFM updates, 2011-2031 ('000s)

	Aut 07 2011-31 (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)
Babergh	4.2	13.3	9.3	9.7	9.6	9.7	5.1
Basildon	-3.6	14.6	9.5	11.4	4.1	4.2	-0.3
Bedford	7.3	18.6	10.6	11.2	8.4	2.8	9.3
Braintree	21.2	10.9	5.1	5.9	4.9	2.7	7.0
Breckland	11.6	14.0	11.5	6.9	6.3	4.5	4.3
Brentwood	7.0	12.8	3.9	3.7	1.2	2.8	3.5
Broadland	6.2	9.8	9.6	10.0	10.5	7.4	8.3
Broxbourne	-1.1	10.2	5.6	6.2	2.9	2.5	3.7
Cambridge	12.7	57.5	53.6	40.3	32.7	35.9	22.1
Castle Point	4.0	5.9	3.1	3.5	1.3	0.6	2.0
Chelmsford	14.4	22.4	18.6	21.3	14.2	13.6	35.9
Colchester	10.8	15.7	11.7	14.1	12.9	8.7	18.1
Dacorum	17.6	23.3	15.6	16.5	12.9	11.0	10.5
East Cambridgeshire	11.2	13.2	11.6	11.0	7.7	8.2	7.7
East Hertfordshire	13.6	11.1	11.9	13.6	8.1	6.8	9.6
Epping Forest	8.6	9.4	7.5	9.1	4.2	3.2	11.2
Fenland	11.0	6.0	5.8	5.9	7.5	5.4	4.9
Forest Heath	3.0	9.1	4.0	3.9	3.8	3.2	3.3
Great Yarmouth	11.8	5.5	3.0	3.5	0.7	-1.1	4.0
Harlow	3.3	13.0	0.1	0.3	0.0	-2.2	3.9
Hertsmere	13.8	31.0	18.7	19.8	15.3	15.7	7.0
Huntingdonshire	3.3	19.3	11.7	10.8	6.3	3.4	5.0
Ipswich	7.7	17.3	12.9	12.8	8.0	4.6	12.7
Kings Lynn and West Norfolk	6.3	1.9	1.1	11.6	16.2	12.7	3.6
Luton	10.5	14.4	5.0	9.5	22.2	17.7	16.1
Maldon	1.9	6.1	4.1	4.4	2.5	2.5	4.0
Mid Bedfordshire	29.7	16.6	15.9	14.4	11.2	10.3	13.2
Mid Suffolk	6.9	3.0	0.5	11.1	9.8	9.1	4.4
North Hertfordshire	13.1	26.7	10.5	5.5	5.3	4.4	5.5
North Norfolk	11.4	1.0	1.1	1.1	2.5	0.9	2.4
Norwich	10.2	14.3	11.3	11.9	12.5	8.7	16.5
Peterborough	16.9	9.2	10.9	11.7	6.2	3.7	17.6
Rochford	9.4	2.2	1.5	2.5	1.7	1.0	3.4
South Bedfordshire	6.8	19.3	5.0	5.7	3.9	3.1	4.8
South Cambridgeshire	16.0	29.0	21.3	21.2	25.2	27.6	24.8
South Norfolk	7.1	19.8	15.7	17.9	15.2	12.8	9.3
Southend-on-Sea	4.1	16.4	10.3	10.8	6.4	3.3	3.8
St Albans	14.8	27.7	18.1	17.1	16.7	16.9	16.8
St Edmundsbury	6.0	16.5	12.8	12.6	8.8	6.6	5.5
Stevenage	16.3	17.7	10.1	11.4	11.5	10.7	3.5
Suffolk Coastal	6.4	12.9	11.0	11.7	9.6	8.6	6.1
Tendring	8.1	10.4	5.5	5.1	4.7	1.0	5.6
Three Rivers	1.5	7.2	4.4	4.3	3.6	3.9	4.7
Thurrock	17.3	19.5	13.3	13.6	9.9	6.7	29.7
Uttlesford	9.1	4.2	8.9	8.0	5.6	4.2	3.9
Watford	0.7	23.5	10.6	10.7	3.2	6.2	21.9
Waveney	7.0	-1.2	2.2	2.3	2.7	0.5	0.4
Welwyn Hatfield	15.0	17.0	9.7	7.1	13.1	13.6	19.6
Eastern	**452.1**	**699.3**	**475.7**	**494.5**	**413.5**	**350.2**	**445.8**

Source: Oxford Economics

Table 6.7: Comparison of GVA growth per annum between EEFM updates, 2011-2031 (%pa)

	Aut 07 2011-31 (% 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)	Spr 12 2011-31 (% pa)
Babergh	2.7	2.9	2.8	2.7	2.9	3.0	2.7
Basildon	2.3	2.8	3.0	2.9	2.2	2.2	1.9
Bedford	2.5	2.5	2.5	2.3	2.2	2.0	2.4
Braintree	3.5	2.5	2.6	2.4	2.0	2.0	2.4
Breckland	3.0	2.6	2.9	2.4	2.2	2.2	2.2
Brentwood	3.2	3.3	3.1	2.6	2.1	2.2	2.4
Broadland	2.6	2.7	2.8	2.8	2.6	2.6	2.8
Broxbourne	1.9	2.7	2.8	2.5	2.1	2.2	2.4
Cambridge	2.7	3.9	4.6	3.6	3.3	3.2	2.8
Castle Point	2.8	2.7	2.7	2.4	1.8	1.9	2.0
Chelmsford	2.7	2.9	3.2	3.0	2.3	2.3	3.2
Colchester	2.7	2.8	2.7	2.5	2.3	2.2	2.7
Dacorum	2.9	3.0	3.0	2.6	2.5	2.5	2.7
East Cambridgeshire	3.8	3.4	3.4	3.3	2.8	3.1	3.0
East Hertfordshire	2.8	2.5	2.8	2.5	2.4	2.4	2.6
Epping Forest	2.7	2.2	2.5	2.3	1.9	2.0	2.7
Fenland	3.1	2.5	2.8	2.5	2.5	2.4	2.5
Forest Heath	2.6	2.8	2.8	2.3	2.3	2.3	2.5
Great Yarmouth	3.6	2.5	2.6	2.2	1.8	1.7	2.1
Harlow	2.3	3.0	2.6	2.4	1.9	1.7	2.2
Hertsmere	2.9	4.0	3.7	3.5	3.2	3.3	2.7
Huntingdonshire	2.3	2.7	2.7	2.5	2.0	2.0	2.2
Ipswich	2.4	2.8	2.9	2.8	2.3	2.1	2.6
Kings Lynn and West Norfolk	2.7	2.0	2.3	2.7	2.8	2.7	2.0
Luton	3.0	2.4	2.5	2.4	2.9	2.8	2.7
Maldon	2.6	2.6	2.9	2.5	2.1	2.2	2.7
Mid Bedfordshire	4.1	2.9	3.2	2.8	2.7	2.7	2.8
Mid Suffolk	2.7	2.0	1.9	2.9	2.8	2.9	2.3
North Hertfordshire	2.9	3.5	3.1	2.5	2.3	2.4	2.5
North Norfolk	3.2	1.8	1.9	1.8	1.9	1.9	2.1
Norwich	2.1	2.5	2.9	2.8	2.5	2.4	2.7
Peterborough	2.6	2.2	2.9	2.8	2.4	2.2	2.7
Rochford	3.6	2.4	2.9	2.5	2.0	2.1	2.4
South Bedfordshire	2.7	3.2	2.6	2.3	2.0	2.0	2.4
South Cambridgeshire	3.2	3.4	3.6	3.4	3.5	3.5	3.2
South Norfolk	2.9	3.2	3.2	3.1	2.9	2.8	2.5
Southend-on-Sea	2.3	2.7	2.8	2.5	2.2	2.0	2.0
St Albans	2.9	3.4	3.6	3.1	3.0	2.9	2.9
St Edmundsbury	2.3	2.7	2.8	2.6	2.4	2.3	2.3
Stevenage	4.2	3.6	3.7	3.4	3.0	2.9	2.2
Suffolk Coastal	2.2	2.7	2.5	2.4	2.4	2.4	2.4
Tendring	3.1	2.6	2.4	2.1	1.9	1.9	2.2
Three Rivers	2.6	2.7	3.0	2.7	2.3	2.4	2.6
Thurrock	2.7	2.9	3.0	2.7	2.3	2.3	3.9
Uttlesford	3.6	2.3	3.2	2.8	2.4	2.4	2.3
Watford	1.8	3.4	3.1	2.8	2.2	2.4	3.3
Waveney	3.1	1.8	2.3	2.0	2.0	2.0	1.9
Welwyn Hatfield	3.1	2.9	2.9	2.4	2.7	2.8	3.0
Eastern	**2.8**	**2.8**	**3.0**	**2.7**	**2.5**	**2.5**	**2.6**

Source: Oxford Economics