

## Annex A: Oxford Economics employment forecast methodology

### Modelling approach

Demand-based modelling is the most common form of forecasting used to predict economic growth at a regional / sub-regional level. This type of modelling relies on understanding of the macroeconomic context, exploring past trends and applying key economic relationships. For scenario work it is based upon determining sensible 'alternate level' (in this report 'upper level') forecasts plausible in a local, national and international context. Frequently this form of modelling leads to the question – what are the underlying assumptions? This can be difficult to answer satisfactorily as the assumptions are traditionally macroeconomic ones (such as oil prices, exchange rates, inflation – see Annex F for slides containing these assumptions for this model) and at a local level the assumptions are essentially:

- That basic economic relationships are not broken over the forecast period (i.e. links between people and jobs, total employment and construction employment, spending and retailing etc)
- That supply side factors (namely skills, land, infrastructure and environment / legislation) remain unchanged in *relative* terms.

This annex sets out an explanation of how this form of demand modelling works and identifies the rationale of not forecasting from a supply perspective in the first instance. The description covers the 'implicit assumption' approach summarised above and also sets out the data sources behind the models used throughout the main report.

### Why not use supply-side modelling?

A supply-side approach to forecasting is often favoured by practitioners. Such an approach may take transport infrastructure/ planned investments, the housing allocation proposed, the land available or the council plans for development and 'work back' to a level of employment. However this approach has not proved successful historically for a range of reasons:

- **Aspiration versus reality:** Targets or policy aims usually have a strong aspirational or 'desired outcome' nature. In reality delivery is much more challenging and many targets cannot be reached (or targets are not compatible with each other) – thus setting sectoral growth aspirations or using lists of available development land as a guide to future growth is unwise as it abstracts from the realities of the economy which fundamentally drive demand (though these factors may be considered to a lesser or greater degree within specific policy / strategic aims)
- **Baseline needs:** If a supply-based approach is used as a scenario it often abstracts from the base position – how much land (or skills or transport) will already be required to meet the demand generated within the baseline?
- **Displacement:** Looking at a supply audit by way of generating extra jobs can lead to under consideration of displacement, either at a local or a more aggregate level. This is particularly the case in sectors such as retailing where the long run demand is likely to be relatively fixed over a

given geography and any new out-of-town developments may be at the expense of retail jobs in town centres.

- **Market forces:** The market has a habit of finding a ‘way around’ policy, strategic aims or supply constraints to meet the demand need. Examples of this in practice in NI include the development of more out-of-town shopping centres than were envisaged and the importing of labour to meet skills needs in the construction and production industries. With respect to land, current guidelines on, for example height of buildings or permissible sectors, will be reviewed if sufficient economic / social pressure suggests a change is needed. Therefore assuming that supply can dictate demand is a potentially dangerous approach (though clearly it does have an impact).
- **Supply does not equate to demand:** Having supply does not automatically generate demand. It might be argued that in very tight labour and land markets this is not the case – for example almost all housing in the South East of England is taken up as soon as it is available – the supply is a driving factor (though technically it is that existing supply is insufficient to meet current demand so again demand is key). Similarly skills polices may produce a significant number of highly skilled graduates but without appropriate demand they may well migrate out of the area. Clearly not having supply-side barriers help facilitate demand and thus their measurement is crucial but care must be taken in assuming that extra supply will translate directly and immediately into extra demand (an important consideration in a site-based approach which assumes new sites will be developed).

## Demand-based framework

A demand based forecast model depends essentially upon three factors:

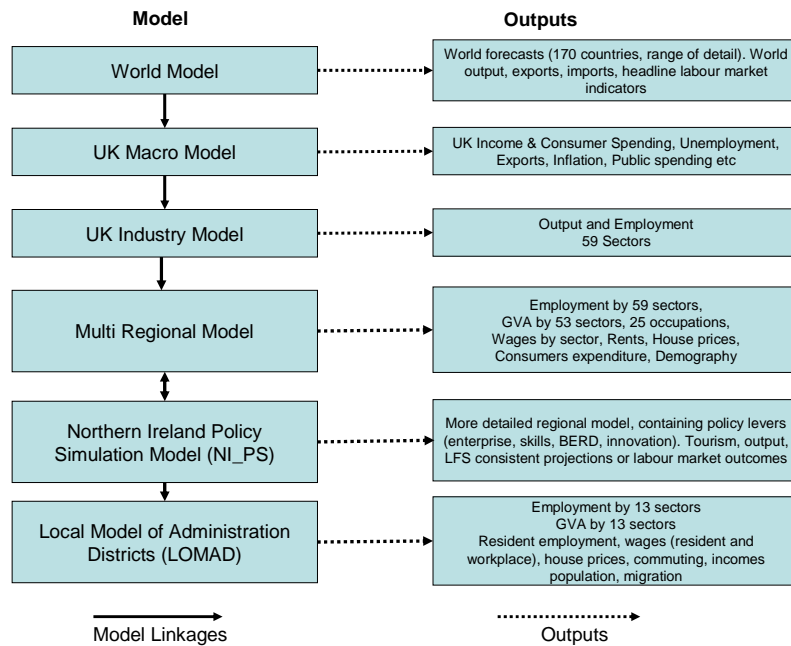
- National / regional outlooks (themselves based on a set of econometric equations)
- Historical trends in an area (which implicitly factor in supply side factors impinging on demand)
- Fundamental economic relationships.

Each of these factors is discussed in more detail below.

### National / regional outlooks<sup>1</sup>

The respected Oxford Economics UK macro model is itself linked to the wide suite of world models and thus is consistent with global trends in demand / commodity prices / exchange rates etc. The UK macro model feeds down into the UK industry model which disaggregates employment and output into broad sectors. This is then a parent to the UK regional model, which the Northern Ireland Policy Simulation version is one of 12 linked models (the NI\_PS model is a more detailed version of the other regional models). Finally the sub-regional models, of which LOMAD is one, sit within this regional framework. Fig A.1 depicts this hierarchal structure of the models.

<sup>1</sup> Additional detail on the Oxford models – international, national and regional, are available upon request

**Figure A1: Hierarchical structure of Oxford Economics' suite of models**


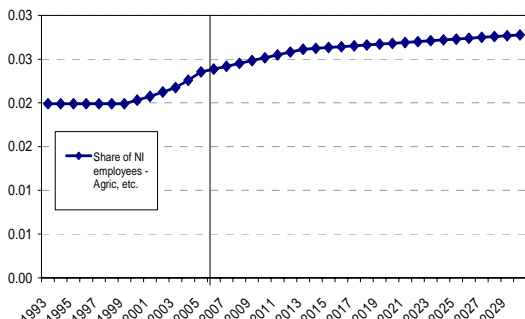
This structure ensures that global factors have a significant impact, indirectly on the forecasts, for say a local council in Northern Ireland. This empirical framework (or set of 'controls') must be borne in mind when considering the historical trend element of the approach.

### Historical trends

The historical trend in an area is used as an important driver of future trends, within the confines of the economic fundamentals (discussed below) and the macro environment (discussed above). The use of historical trends as a basis for projection is often, unfairly, criticised for being too basic and not capturing the local dimension. However, a more complex forecasting approach such as that used within regional and national models are not suitable for local use. Local data is not sufficiently robust with respect to drivers of demand such as rents, prices, rates, wages etc, to facilitate econometric estimation of relationships. Basic 'relationships' are adhered to 'control' the forecasts and make the trend-based approach an appropriate technique. The approach is best described using examples - the following charts set out two forecasts set within the LOMAD model to drive employment in a given sector (further explanation is provided below):

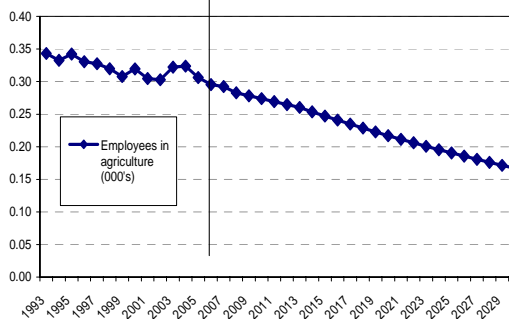
**Figs A.2 – A.5: Forecasts of LOMAD employment ‘share based’ and ‘location quotient based’ examples**

**Fig A.2: Share of NI agriculture employment – Larne**



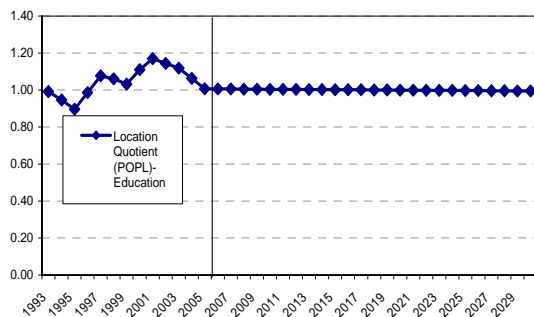
Source: DETI and Oxford Economics

**Fig A.3: Agriculture employment - Larne**



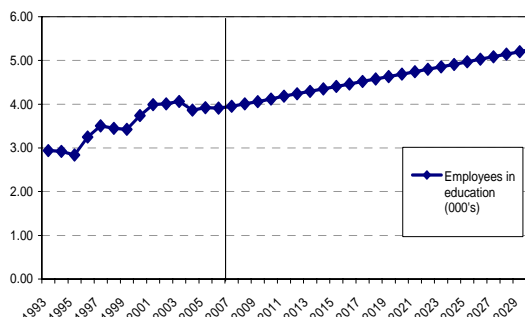
Source: DETI and Oxford Economics

**Fig A.4: Location quotient education employment – Newry & Mourne**



Source: DETI and Oxford Economics

**Fig A.5: Education employment - Larne**



Source: DETI and Oxford Economics

For agriculture in Larne the forecast is set on the share of the Northern Ireland total agriculture employment (which recall itself is modelled on a more complex set of factors of relative UK competitiveness, which itself depend on international demand, input prices, exchange rates etc). The share is rising, as it is an area with competitive advantage in this sector (a reflection of a range of supply side factors such as land and skills) but the overall forecast is for continued job loss, due to the international, national and regional factors.

For education the forecast is location quotient<sup>2</sup> based with local population as the denominator. The historical data shows how stable this indicator is over the past, and thus why forecasting on this basis is sensible (again internal, national and regional factors – such as government budget allocations - lie behind the ‘parent’ forecast). In this case despite a stable forecast in the local performance the outcome is a rising employment projection as population in the area is increasing and at regional level employment education is forecast to rise.

**This method of historical-trend based projection is augmented by local knowledge and principles of forecasting built up over decades of expertise. This is sometimes considered the ‘art’**

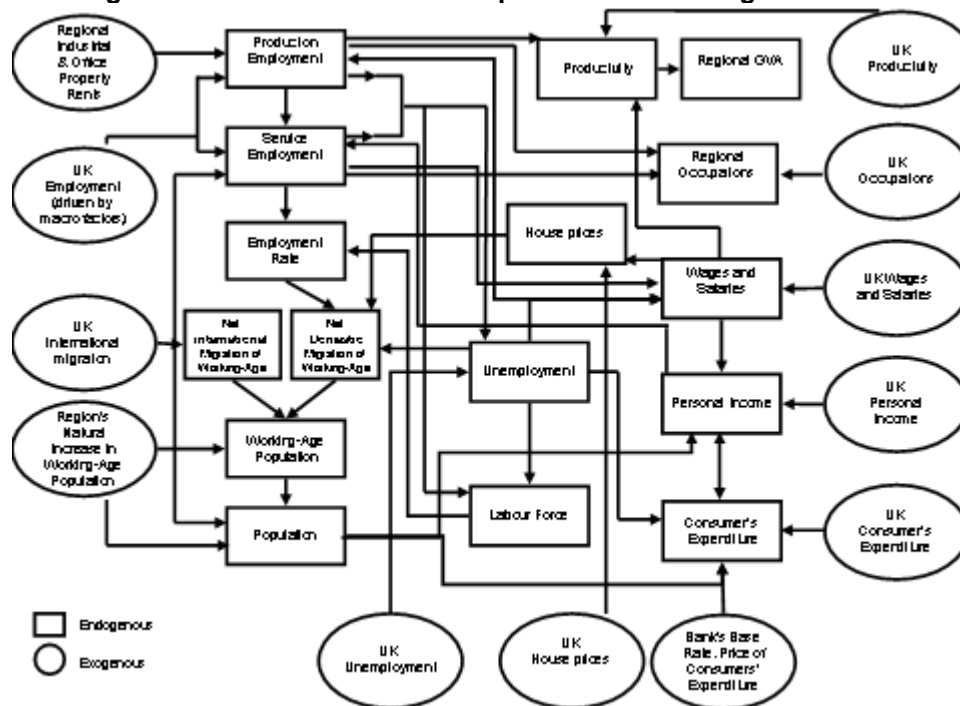
<sup>2</sup> A location quotient (LQ) measure the relative concentration of a given sector compared to the regional as a whole. So for example a 1 means a sub-region has precisely the size of employment that would be expected given its size. LQs can be expressed relative to any common denominator, such as population, total employment or spending.

that complements the ‘science’. It may take the form of imposing maximums on location quotient trends (e.g. retailing will always stay within certain parameters with respect to local spending in a non-exporting retail location). Equally there are minima to projections as a given level of supporting, or secondary, employment is required in a location which may bring to an end a declining trend. Finally known major announcements (closing of a prison, opening a new out of town retail mall) would be factored in if, and only if, they are confirmed as happening in the next 12/24 months (even apparently confirmed developments can fail to come to market for political, for funding or other reasons). The displacement effects are handled by the regional forecasts which ensure that forecasts are, in overall, terms still appropriate given the fundamental economic relationships (see below)

### Economic relationships

The regional model (much as the macro and sectoral models ‘above’ it in the hierarchy structure) adheres to a set of well established economic relationships which interlink the various elements of the outlook. This is best explained via a flow diagram setting out the basic elements of the model

Figure A.6: Economic relationships within the UK regional model



This framework sets out how each of the elements of the model interact and ‘bind’ together. A couple of points are worth making:

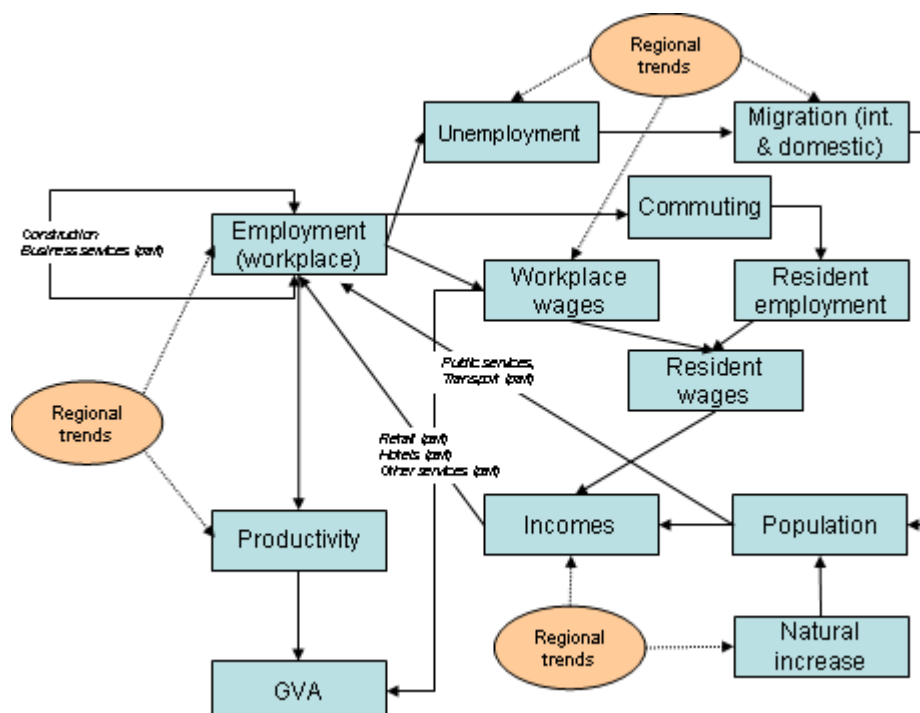
- **Employment driven:** The model determines employment and, via productivity forecasts, GVA forecasts are projected. This is distinct from, for example the sectoral model, which determines output and productivity with employment the final step. Employment is projected independently by sector (59 sectors are covered in the standard model).
- **Indirect multipliers:** The regional model does not employ a detailed input –output framework. This is partly due to the difficulty in attaining reliable data for regional input-output relationships. In a global world purchasing patterns may change from year to year, especially across regional boundaries, and a fixed input output framework may not be sufficiently reliable. As the model links

retail and distribution employment into spending outlooks, public services to population and business-to-business activities and construction into total employment, there are implicit multipliers within the model. The overall indirect / induced employment are cross checked to ensure they are broadly in line with the secondary jobs that an input output framework would produce.

- **Population and labour market linked:** The population forecasts are linked into employment and vice-versa through a number of mechanisms. Migration forecasts, which are key to the population outlooks, depend upon unemployment and house price outlooks (which themselves link to the labour market) and a range of sectors, most notably the public services, have employment linked back into population outlooks. Similarly population forecasts produce income which in turn drives employment in retail and hotel & restaurants.
- **Resident and workplace handled separately:** The main employment and output forecasts are workplace based. Employment forecasts count the number of jobs (so someone with two jobs is counted more than once). Population is obviously resident based and resident employment (people based) is also projected using a fixed commuting matrix to translate workplace jobs into resident employment.

Fig A.7 below sets out the less complex local relationships within LOMAD. The relationships are more basic due to the limitations of data available (the diagram also identifies the links into the LOMAD framework from the regional model).

**Fig A.7: Economic relationships within the LOMAD model**



## Supply-side implications

### Supply side outputs

Though the model is demand-based there are clearly supply side factors implicitly covered within its outlooks. As previously explained the historical trends build in supply side factors but the forecasting framework does not explicitly forecast them. There are supply side implications of the demand

forecasts and it is possible to produce these for reference (or perhaps to identify if there are likely to be constraints impacting during the forecast period). These outputs would include skills projections (usually by NVQ levels), transport (commuting flows by mode of transport) and land use requirements (in hectares). There are other supply side factors which may come to the fore in the future, notably environmental aspects (carbon footprint of production and commuting) which may form a basis for taxation.

The focus of this study is to produce land use forecasts – in other words the supply side implications of the demand based projections produced from the NI\_PS and LOMAD models.

### Scenario analysis

The second way in which supply factors are often treated is through a scenario approach. This approach is to take a supply stimulus and translate this into demand. This might take the form of, for example, an improvement to a transport link or the development of a new site such as the Titanic Quarter. This approach needs to be carefully considered as the issue of displacement must be firmly assessed (this depends also upon the geography being considered – the displacement effect within a council area of a major out-of-town shopping centre may be limited, the effect regionally may well be close to complete, i.e. Sprucefield expansion). Sometimes this ‘counting-up’ of supply side factors is deemed a ‘bottom-up’ method and is often favoured by practitioners due to its tangible and defensible nature. The most common alternative scenario approach is to do a target based method (as is used in this report) which is a largely demand approach and again requires translation into the supply side implications of the demand forecast (as has been done in this report).

### Data sources

The data sources used in the NI\_PS and LOMAD models are as follows:

**Table A1: Data sources in NI\_PS and LOMAD models**

Data	Source	Notes
Population	NISRA	Mid year
Migration	NISRA	Mid year
Employees	DETI	June figures, sectoral detail by special request from DETI
Self employed	LFS / Census / Oxford Economics	Estimated using LFS regional data, employee information and census controls
Unemployment	NISRA	Claimant count
Resident employment	LFS, LADB, Census	Regional data controlled to census and estimated using rolling LFS average. LADB source for DC data controlled to regional totals
Commuting	Oxford Economics	Workplace employment (adjusted to be a people measure using part-time employment data and census controls) minus resident employment
GVA	Regional Accounts / Oxford Economics	Regional data taken from regional accounts, local GVA estimated using regional productivity, wages data and NUTS 3 control totals
Wages	ASHE	Regional and local data from ASHE