Update on Construction Output Statistics

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1. Introduction

This article describes the interim solution for construction Output Price Indices (OPIs) proposed by ONS to replace the statistical models currently being used in the production of Chained Volume Measures (CVMs) for Output in the Construction Industry for quarters 3 (July to Sept) and 4 (Oct to Dec) of 2014 and to provide an ongoing source of data from quarter 1 (Jan to Mar) of 2015.

2. Background

In December 2014, the Department for Business, Innovation and Skills (BIS) announced the suspension of its publication of Construction Price and Cost Indices (CPCIs). These price statistics were used in the production of Output and New Orders in the Construction Industry and in the absence of these statistics, ONS created a statistical model of the quarter 3 (July to Sept) 2014 OPIs to deflate the current price series. More information on how these models were created can be found in the article 'Modelling Construction Statistics Deflators'.

In producing the statistical models as a substitute for the CPCIs, ONS has been conscious of the statistical uncertainty that surrounds them. When the statistical models were carried forward for the quarter 4 (Oct to Dec) OPIs, this uncertainty increased and ONS advised caution when interpreting the resulting CVMs of construction output. To carry the statistical models forward would lead to further concerns.

On 1 April 2015, responsibility for the production of the CPCIs transferred from BIS to ONS. This transfer, which included transfer of the management of the contract with AECOM, means that ONS will be responsible for re-instating the regular publication of the CPCIs and for seeking re-designation as National Statistics. No acceptable methodology has been agreed to date and ONS will continue to work with users to consider the best approach to develop new methods in the long term.

ONS recognises the need for a short-term solution both to replace the statistical models used for Output in the Construction Industry and to satisfy the needs of wider users. ONS has therefore developed an interim solution that is intended as a short-term measure to provide users with data of improved quality when compared to the model estimates currently being used. The interim solution will be applied while the development of a long-term solution for new price indices takes place. ONS will publish full plans for this long-term development as soon as possible.

3. Developing an interim solution

ONS has analysed a range of data sources to determine if OPIs could be derived from data such as the House Price Index (HPI), Producer Price Indices (PPIs), Earnings data and Services Producer Price Indices (SPPIs). Additionally, we have looked at guidance from Eurostat and the OECD on Construction Price Statistics and Purchasing Power Parities (PPPs) and have derived our interim solution from this research.

The proposed interim solution is a project cost approach where we enumerate the input costs of different construction projects. This approach is implemented slightly differently for new work and repair and maintenance as described below. A number of alternative approaches have also been considered, as set out in Table 1. It is worth noting that in the proposed project cost approach and in each of the alternative options considered, it is possible for ONS to produce a monthly price series that could replace the quarterly series currently used which will minimise the revisions to construction output data caused by revisions to quarterly deflators that were previously interpolated to a monthly series.

Table 1: Alternative solutions considered for each type of work

Type of work	Alternative options considered
Private new housing Public new housing	New dwellings HPI, including potentially an adjustment for land prices
Infrastructure	Infrastructure UK data (still in consultation)
Public other new work	No alternative considered
Private industrial	Investment Property Databank (IPD) data (returns on industrial properties)
Private commercial	IPD data (returns on commercial properties)
Housing repair and maintenance	No alternative considered
Non-housing repair and maintenance	No alternative considered

Of the options considered but rejected, using the new dwellings series from the HPI would require an adjustment for land prices. While some work has been completed on this, measures of land prices are difficult to obtain without using some element of statistical modelling. Furthermore, it is difficult to assess the weights that would be apportioned to different types of land (e.g. brownfield, rural and urban land prices) which could not be completed in time for implementation. In addition the HPI is based on the retail price of housing and not the build cost. Consequently the project cost approach is our preferred interim solution.

ONS has not ruled out the use of data from Infrastructure UK and is continuing to meet with the Infrastructure UK team to discuss the supply of data on road prices, rail prices and other prices. This could give a better coverage of infrastructure than the proposed interim solution. However, ONS is unable to access this data at the present time and further work will be required to determine if it can be used to construct price indices.

The IPD data was also considered as a potential source of data, but there are a number of conceptual issues that make it less suitable for the measurement of construction prices. For example the data show the returns on a fund of properties and will include both new and existing properties (information on the former is only desired for an output price index) and in this case ONS is only concerned with the price change for new building construction. In addition the 'capital growth' index, that is likely to be the best metric of price change, can be distorted by properties moving in and out of the fund, that is sales and purchases. There are also other conceptual issues with it such as how representative the fund is of the UK market as a whole.

4. Interim solution for new work

To measure price change for the components of construction projects for new work we are considering three main categories of inputs: labour; plant; and materials.

4.1 Labour

To measure labour costs ONS proposes to use the Average Weekly Earnings index (AWE) for construction. The AWE is not available at a more detailed level than this so it is used at an all construction level for each of the different work types. It is recognised that a measure of unit labour costs that accounts for changes in labour productivity would be more beneficial; however, users should note productivity measures will be derived in part from the volume of output and thus including it would mean any method will introduce issues of circularity.

4.2 Plant

To measure changes in the price of plant used for construction prices, ONS proposes to use the SPPI for construction plant hire. This index measures changes in the price to hire construction plant without an operator and includes items such as cranes, earth-moving equipment and site accommodation. This index is compiled on a quarterly basis only so interpolation would be required to produce estimates on a monthly basis.

4.3 Materials

For material costs we are proposing to use an aggregate of relevant individual PPIs. The selection of PPIs used to represent material costs is based on the data ONS submits to Eurostat as part of the European Price Comparison Programme used to calculate the PPPs.

4.4 Purchasing power parities

The objective of the PPPs is to compare the purchasers' prices actually paid for a basket of comparable goods and services between countries. Included in this basket are buildings and civil engineering works,

and as part of the European Price Comparison Programme, the UK must submit prices to Eurostat for a selection of projects on an annual basis. The approach taken is for experts in each country to provide a price for a selection of 'fictitious but representative' projects that are defined using Bill of Quantities (BoQs). These BoQs are priced by AECOM under contract to ONS.

For the purposes of this interim solution, we are proposing to use these BoQs to define projects that are representative of UK construction and, by matching PPIs with materials defined in the BoQs, to determine which selection of PPIs to use. The projects for which the UK is asked to return prices to Eurostat as part of the PPPs are: detached house; 'Nordic' style housing development[1]; apartment; factory building; new office building; asphalt road; and a bridge. The representative projects chosen for use in the construction output price indices for each type of work are shown in Table 2.

Table 2: Representative projects selected for each type of work

Type of work	Bill of quantity
New Housing	Detached house and apartment
Infrastructure	Roads and bridges
Public Other	New office building
Private Industrial	Factory Building
Private Commercial	Factory Building or new office or combination of the two.

The construction projects selected from the BoQs defined by Eurostat for the PPPs were chosen as they are considered to be most reflective of the type of work undertaken in each category. For example, granular data shows around 50% of private industrial work is concentrated in the building of factories, with the remainder concentrated in projects where factories could conceptually be used as a reasonable proxy[2]. Where two representative projects have been selected for a single type of work, the resulting materials indices for each project will need to be aggregated together. We are investigating appropriate sources of data that can be used to achieve this.

Each BoQ provides details of the quantities of different materials needed for each project type, with materials typically grouped into nine 'material categories' (for example 'concrete' or 'earthworks').These categories are the same for each of the BoQs and are listed in Table 3. The overall index for all material costs is then created by weighting the material categories by their relative estimated cost in the whole project. Table 3 provides an example of this weighting for a factory building used as an interim solution for Private Industrial new work.

[1] A single family home consisting of one and a half storey
[2] Table 5 in the 'Output in the Construction Industry' release

Table 3: Example weighting structure of material categories for Private Industrial new work

Category	Estimated cost (£)	Weight
Earthwork	89,296	3.8
Concrete	374,222	16.0
Masonry	76,474	3.3
Joinery/metal work	1,004,946	42.9
Finishings	44,086	1.9
Sanitary fittings	135,618	5.8
Heating and ventilation	314,076	13.4
Electrical installations	275,899	11.8
Drainage	28,917	1.2
Total	**2,343,534**	**100**

Within each of these nine material categories, the BoQ sets out the exact materials required and their associated quantities. For each of these individual materials, ONS has matched it with the most appropriate PPI (for example, '19cm hollow concrete block walls' has been matched to the PPI for 'articles of cement, concrete or artificial stone not elsewhere classified'). These individual indices are aggregated to form an overall index for each of the nine material categories, using the estimated cost for each material as a proportion of the cost for the whole material category. Table 4 shows the individual materials that make up the materials category for 'finishing', the PPI that has been matched to each material and the weight used to combine these PPIs into an overall index for 'finishing'.

Table 4: Example of how the 'finishing' material category for private industrial is weighted together

Item specification	PPI match	Weight
Cement mortar screed over slab (3cm)	Cement	2.8
3cm float finish screed over slab and mezzanine floor where PVC to be laid	Floor, wall or ceiling coverings of plastics, in rolls or in the form of tiles	9.3
PVC covering, 2mm tiles, incl. skirting and brass sills	Floor, wall or ceiling coverings of plastics, in rolls or in the form of tiles	9.6
Mortar-set vitreous glazed floor tiles 10 x 10 cm in plumbed rooms, incl. skirting	Non-refractory ceramic building bricks, flooring blocks, support or filler tiles and the like.	12.5
Adhesive-set white ceramic wall tiles, 15 x 15cm	Ceramic tiles and flags	15.5
Hard concrete flooring, 4cm	Ready mixed concrete	37.3
Painting over plaster: preparation + 2	Paints & varnishes based on polyesters, acrylic or	2.9

coats acrylic paint	vinyl polymers, in a non-aqueous medium; solutions	
Painting over pointed masonry, 2 coats of acrylic paint.	Paints & varnishes based on polyesters, acrylic or vinyl polymers, in a non-aqueous medium; solutions	10.2
Total 'Finishing' material category		100

The Monthly Business Survey – Construction, forms the basis of all current price data published in the monthly Output in the Construction Industry release. The variables collected under this survey all ask for the value of work completed in a given period. Respondents are asked to exclude the work completed by consultants or architects and the value of land. As a result, some items that feature on the BoQs, such as architectural and engineering fees, have not been included when compiling a price index using this project cost approach.

4.5 Weights

An obvious source of weights to allow us to aggregate our separate indices for labour, plant and materials is not available. Data from the Annual Business Survey suggests that expenditure on labour and materials is approximately equal but consideration of additional data sources is required to confirm this and to suggest a suitable weight for the plant component. Since the final weights used will be subject to a degree of uncertainty, we will be conducting a sensitivity analysis to determine the most appropriate weighting pattern.

5. Interim solution for repair and maintenance

For repair and maintenance we have considered two main categories of input: labour and materials. For new work, plant is required mainly to carry out earth works, something that is not required to such an extent for repair and maintenance, hence its exclusion.

For materials, the representative project cost approach is not possible for repair and maintenance, mainly due to an absence of representative BoQs. However, an interim solution for this work type has been found using a combination of Consumer Price Indices (CPIs) and material prices in the form of PPIs.

5.1 Housing repair and maintenance

For housing repair and maintenance a combination of the CPI for 'services for the regular repair of dwelling' is proposed to measure changes in labour costs and PPIs for a selection of materials deemed relevant to residential repair and maintenance is proposed. This combination of indices is used to produce an index for 'renovations' that is used in the Net Acquisitions approach to Owner Occupied Housing currently published by ONS.

The CPI for 'services for the regular repair of the dwelling' is compiled from the hourly rate for plumbers, electricians, carpenters and decorators and thus provides direct observation of output price for this type

of work. It is noted that the index does not provide an estimate for general builders. The PPIs that are used to represent the materials used are shown in Table 5. The weights used in the repair and maintenance index are derived from the PPI weights. The weighting of the labour and materials components into the overall index for 'renovations' is based on the split for services and materials used within the CPI for 'Regular Maintenance and Repair of the Dwelling. This is updated annually and has changed over time.

Table 5: Materials included in the Renovations Index (PPIs)

Material	Weight
Particle boards & similar boards of wood or other ligneous materials	3.8
Windows, French windows & their frames, doors and their frames	9.2
Builders' joinery & carpentry of wood nec	8.3
Wallpaper	0.5
Doors, windows & frames & thresholds for doors; shutters, blinds	17.4
Builders' ware of plastics nec	3.4
Ceramic tiles and flags	0.4
Bricks, tiles & construction products, in baked clay	3.5
Metal structures & parts of structures	38.8
Doors & windows of metal	9.4
Central heating radiators & boilers	5.4

ONS is using the same index for private and public housing repair and maintenance as we are unable to split the services element of this work to account for differences in the amount charged for private and public clients.

5.2 Non-housing repair and maintenance

Non-housing repair and maintenance will use a similar approach to that of housing repair and maintenance. However, we recognise that the materials used for non-housing will be different and are therefore determining the most appropriate mix of materials for this type of work.

6. Limitations

This interim solution has been developed in a relatively short time frame and while we feel that it is more robust than the statistical models used to estimate deflators for quarters 3 (July to Sept) and 4 (Oct to Dec) of 2014, the method does have some limitations. The key limitations are:

- The use of the AWE to measure changes in labour costs assumes productivity is constant throughout time. While this assumption may be appropriate to make over the short-term, it is less likely to hold in the long-term. Labour costs also include pension contributions and National

Insurance costs. However, these tend to be proportional to earnings, and so will generally move in line with the AWE;

- The selection of representative projects used to determine material costs have been selected by Eurostat to represent construction projects across EU member states. As a result, they may not be most representative of construction projects in the UK;
- PPIs and SPPIs measure changes in the amount of money received by UK producers of goods and service providers. The price paid by UK construction companies in the UK may not move in a similar way due to discounting or imports;
- The project cost approach assumes that input costs move in the same way as output prices meaning that the margins of construction companies are constant through time. This assumption is unlikely to hold, however, margin changes are difficult to directly measure. In addition, methods for modelling margins often require the volume of output and productivity, which would introduce aforementioned issues with circularity.

7. Implementation

The proposed interim solution will be implemented in the April 2015 Output in the Construction Industry release on 12 June 2015. The approach used for new work types will also be used in the New Orders data set released the same day. The revisions period for the April 2015 release will permit ONS to take these deflators back to January 2014, thereby replacing the model indices produced for quarters 3 (July to Sept)and 4 (Oct to Dec) of 2014 and the index values for quarter 1 (Jan to Mar) and quarter 2 (Apr to Jun) of 2014 as published by BIS. ONS is investigating the possibility of using this approach for earlier periods.

8. Revisions

Implementation of this interim solution will inevitably lead to revisions to Output in the Construction Industry and potentially to Gross Domestic Product (GDP) and Gross Fixed Capital Formation (GFCF). Initial analysis shows that revisions to Output in the Construction Industry from January 2014 onwards are likely to be small. An article will be released on the 12th of June which will provide users with an insight of the change to earlier periods to construction output. This article will also open up a period of consultation on the interim method.

9. When will a final solution be in place?

ONS is continuing to work with AECOM to determine appropriate methodologies for the Construction Price and Cost Indices (CPCIs). A note providing progress and advice to users on suitable alternatives in the absence of these statistics will be issued shortly.