# Modelling Construction Statistics Deflators

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## Introduction

Following an announcement by the Department of Business Innovation and Skills to suspend the publication of its construction cost and price indices[1], the Office for National Statistics, has used statistical models to create price indices used for the deflation of current price output in the construction and new orders data. This article provides a summary of the methods and the resulting indices for Q3 2014.

## Background

The Office for National Statistics (ONS) currently uses construction price statistics to remove the effects of price movements (deflation) from current price estimates of the construction industry. Tender price indices are used to deflate new orders in the construction industry; these tender price indices are then converted by ONS to output price indices, which are used to deflate output in the construction industry.

The tender price indices are supplied to ONS by Aecom under a contract with the Department for Business Innovation and Skills (BIS). When this contract was let in July 2013, Aecom embarked on a programme of change to update and refresh the methodology. Following initial quality assurance of the new indices, BIS has concluded that further investigatory work is needed before they are ready for publication.

Thus in order to continue publishing chained volume measures of output in the construction industry and volume measures of new orders, ONS has created statistical models of the tender and output price indices for Q3 2014 needed for the deflation of the corresponding current price data.

## Method used

### Tender price indices

All tender price indices (TPI's) have been created using automotive identification and modelling RegSARIMA models from the GSS recommended software X-13-SEATS. The results for these TPI's are shown in table 1a of Annexe A.

### Output price indices

Output price indices (OPI's) have been created in two ways. The OPI's for:

- Private housing
- Public housing repair and maintenance
- Private housing repair and maintenance
- Non-housing repair and maintenance

[1] https://www.gov.uk/government/collections/price-and-cost-indices

Have been created using automotive identification and modelling RegSARIMA models from the GSS recommended software X-13-SEATS. The results for these TPI's are shown in table 2a of Annexe A.

The OPI's for

- Public housing
- Infrastructure
- Public other new work
- Private industrial
- Private commercial

Use the statistically modelled TPI's for this type of work and are then 'grown' using a weighted model of the previously published quarters of the TPI's. The following weighting system is applied.

Table 1. Periodic weights applied to TPI's to calculate OPI's

| | Period | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | n-1 | n-2 | n-3 | n-4 | n-5 | n-6 | n-7 | n-8 | n-9 | n-10 |
| Public housing | 0.07 | 0.14 | 0.18 | 0.2 | 0.17 | 0.13 | 0.08 | 0.04 | | | |
| Infrastructure | 0.07 | 0.11 | 0.13 | 0.13 | 0.13 | 0.12 | 0.1 | 0.08 | 0.06 | 0.04 | 0.02 |
| Public non-housing | 0.08 | 0.16 | 0.2 | 0.2 | 0.17 | 0.12 | 0.07 | 0.03 | | | |
| Private industrial | 0.16 | 0.28 | 0.27 | 0.17 | 0.09 | 0.05 | | | | | |
| Private commercial | 0.12 | 0.2 | 0.21 | 0.19 | 0.14 | 0.09 | 0.05 | | | | |

**Quality assurance**

All statistically modelled data has been create and quality assured by experts from the Office for National Statistics Time Series Analysis Branch.

**Annexe A**

Table 1 – Statistically modelled TPI's, methods and quality information

| Series | Transformation | Model | Regression | Forecast | 95% CI | Average absolute percentage forecast error (last 3 years) |
|---|---|---|---|---|---|---|
| Public housing | None | (1,1,1)(0,0,1) | Constant<br>LS2011.2 | 203.3 | (199.5, 207.5) | 0.8155 |
| Infrastructure | Log | (1,1,1)(0,0,1) | Constant | 133.2 | (131.4, 135.0) | 1.4402 |
| Public non-housing | None | (1,1,1)(1,0,0) | Constant | 202.6 | (198.4, 206.7) | 1.1324 |
| Private industrial | Log | (0,1,1)(0,1,1) | None | 190.2 | (181.8, 199.0) | 4.5273 |
| Private commercial | Log | (3, 1, 1) | AO2013.2 | 199.6 | (192.9. 206.5) | 3.2057 |

Table 2 – Statistically modelled OPI's, methods and quality information

| Series | Transformation | Model | Regression | Forecast | 95% CI | Average absolute percentage forecast error (last 3 years) |
|---|---|---|---|---|---|---|
| Private housing | Log | (0,1,1)(0,1,1) | Constant<br>AO2006.1<br>LS2009.2 | 205.6 | (204.1, 207.6) | 0.8792 |
| Public housing R&M | Log | (0,1,0)(1,0,0) | Constant<br>AO2009.1 | 187.7 | (183.6, 191.9) | 1.3991 |
| Private housing R&M | Log | (1,1,1)(1,0,0) | Constant | 377.7 | (369.1, 386.4) | 0.9271 |
| Non-housing R&M | None | (1,1,0) | None | 180.5 | (176.8, 184.2) | 0.9467 |