



Department
for Business
Innovation & Skills

**SEASONAL ADJUSTMENT OF KEY
DATA SERIES IN THE MONTHLY
STATISTICS OF BUILDING
MATERIALS AND COMPONENTS**

AUGUST 2014

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Seasonal Adjustment of Key Series in the Monthly Statistics of Building Materials and Components

In work done for the Department for Business, Innovation and Skills (BIS) on improving the quality of statistics published in the Monthly Statistics of Building Materials and Components, the Office for National Statistics' Methodology Advisory Service (MAS) recommended that BIS should start seasonally adjusting key data series (see [ONS/MAS review of building materials statistics: final report](#) for more detail). Seasonal adjustment is widely used in official statistics and aids data interpretation by removing effects associated with the time of the year or arrangement of the calendar.

BIS is seeking views to help define several aspects of the seasonal adjustment policy, including scope, constraining to annual totals, revision policy/policies and presentation format.

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This consultation is relevant to: construction firms, supply firms, trade associations, consultants, government officials, academics, and anyone with an interest in data on the deliveries of bricks, cement, concrete blocks, ready-mixed concrete, sand and gravel.

1. Background information

In work done for the Department for Business, Innovation and Skills (BIS) on improving the quality of statistics in the Monthly Statistics of Building Materials and Components, the Office for National Statistics' Methodology Advisory Service (MAS) recommended that BIS should start seasonally adjusting key data series¹. Seasonal adjustment (SA) is widely used in official statistics and aids data interpretation by removing effects associated with the time of the year or arrangement of the calendar from the data series.

Charts accompanying each of set of monthly construction building materials tables plot moving totals for deliveries for some important building materials (see figures 1 and 2 for examples). Using moving totals is a simple way of removing most of the seasonality from a data series. However, the lines plotted can be thought of as "asymmetric" and "left-sided". For example, the value plotted for 2011 quarter 2 is the mean of the values for the four quarters from 2010 quarter 3 to 2011 quarter 2. However, ideally the mean should be calculated such that 2011 quarter 2 is the mid-point of the range from which the mean is calculated, ie a symmetric moving average. This would ensure that the graph is appropriately centred. As MAS explained in their report, "one problem with symmetric moving averages is that values cannot be calculated for the ends of the series. This means that, for example if a 12 month moving average were being used then there would be a delay of six months before the estimate for a new month could be produced...But then this means that the graph is no longer appropriately centred: turning points on the graph will be seen half a year 'too late'."

¹ <https://www.gov.uk/government/publications/ons-mas-review-of-building-materials-statistics>

Figure 1: Chart showing 12-month moving totals for deliveries of bricks, concrete blocks and cement

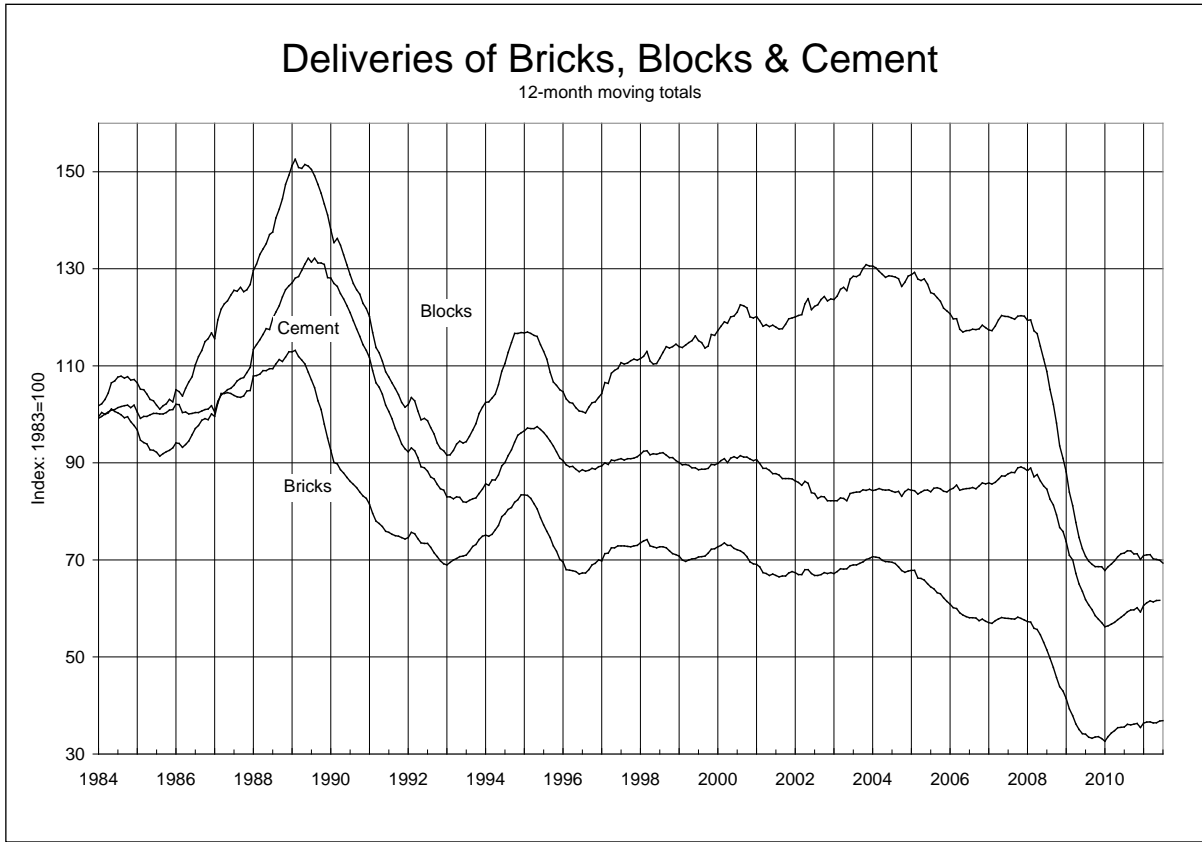
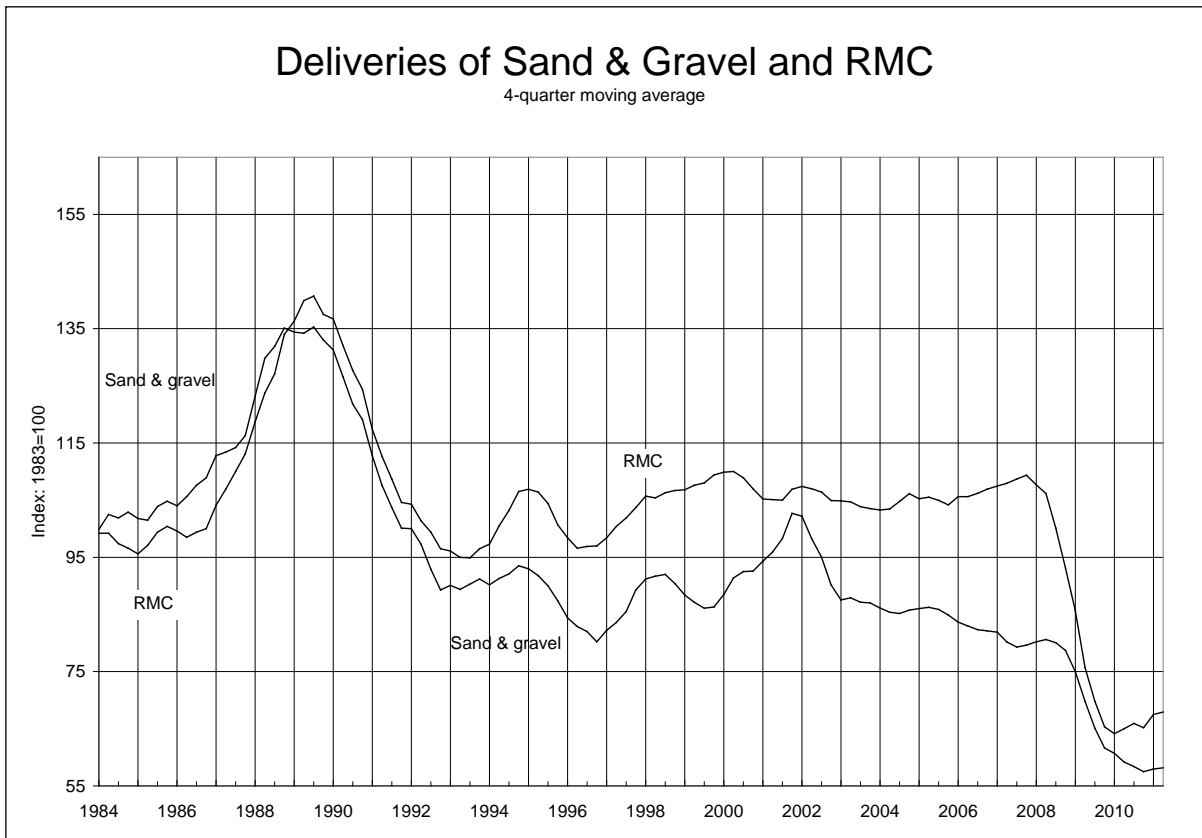


Figure 2: Chart showing 4-quarter moving average for deliveries of bricks, concrete blocks and cement



Seasonally adjusting the series (using the X-12ARIMA seasonal adjustment package) resolves this problem as it appropriately removes most of the seasonality from the series ('most' because the seasonality must be estimated, it cannot be known exactly). It does this for the whole data series, including the most recent data points.

MAS produced seasonal adjustment methodologies for statistics on the delivery of several materials:

- Bricks (Monthly)
- Concrete Blocks (Monthly)
- Ready-Mixed Concrete (Quarterly)
- Sand & Gravel (Quarterly)

Monthly cement figures were considered for seasonal adjustment and MAS developed a methodology. However, changes to the publication cycle in January 2014 (detailed in the [Pre-announced amendments to 'Building materials and components monthly statistics'](#)) saw publication of the monthly data series cease, with data available on an annual basis.

As an example, Figure 3 illustrates the effect seasonal adjustment has on the total deliveries of concrete blocks. This chart, other charts of SA data series and SA data tables are available from the [ONS/MAS review of building materials statistics: final report](#).

Figure 3: Chart showing trends for unadjusted (black line) and seasonally adjusted (red line) deliveries of concrete blocks

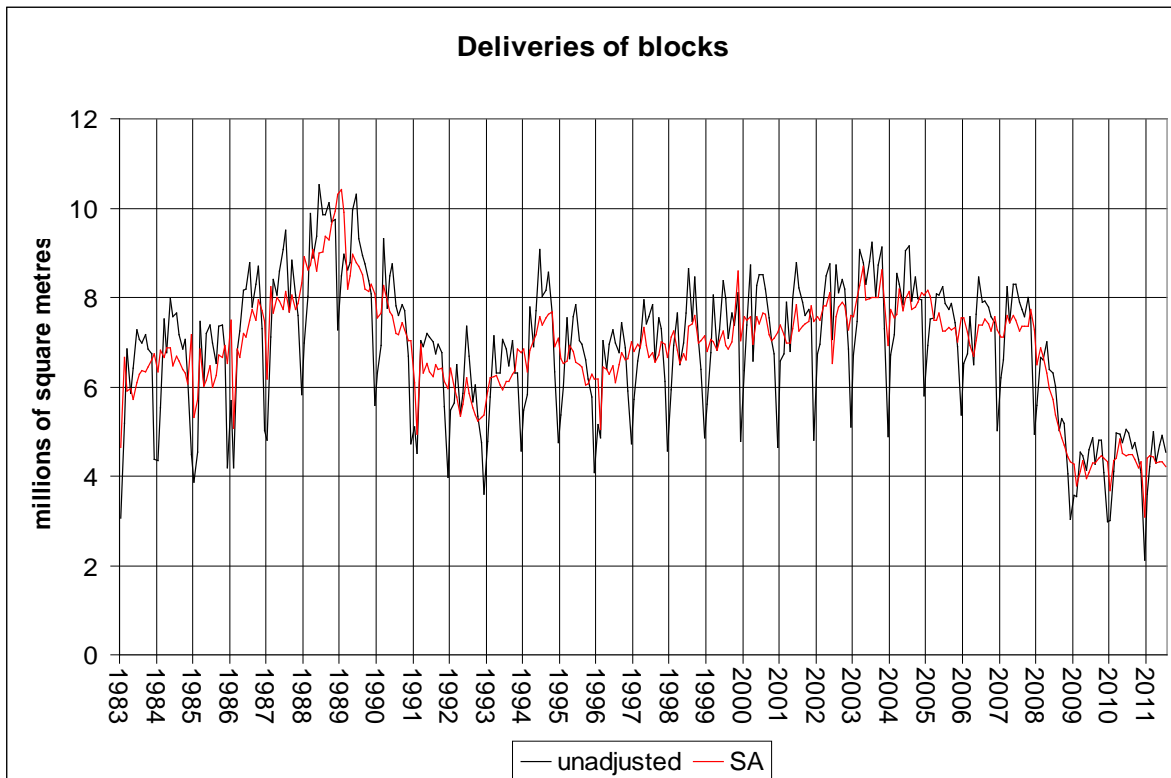
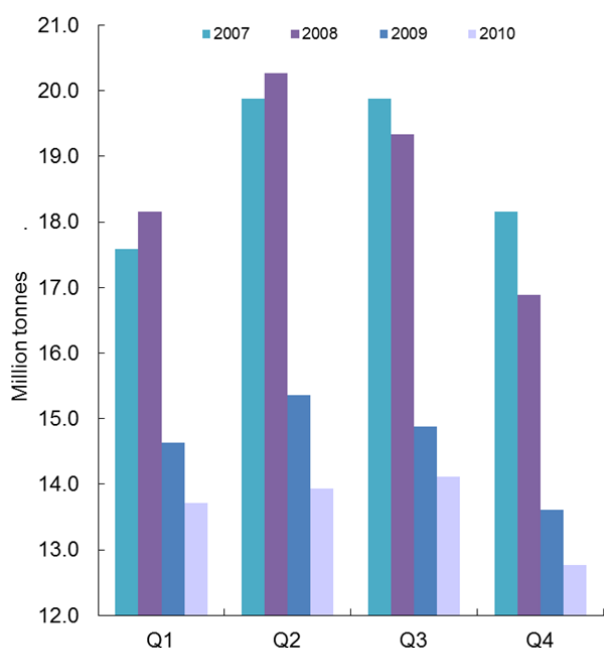
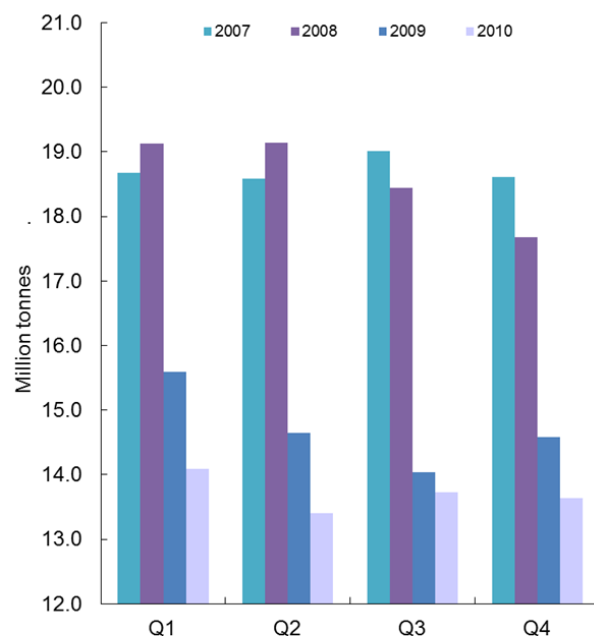


Figure 4 also illustrates the effect that seasonal adjustment can have on a data series. Total deliveries of sand and gravel are plotted for each quarter in each year 2007-2011. In the unadjusted series (left), differences between quarters may be due to the unequal number of working days in each quarter. This is called a Trading Day Effect - since more construction work takes place in the week rather than at weekends, we would expect to see higher demand for deliveries of materials in those periods that happen to contain more weekdays. With the seasonality removed (chart on the right) there is a lot less quarter-on-quarter variation compared with the variation between the unadjusted quarters. The seasonally adjusted data gives a truer reflection of the underlying trend, uninfluenced by any seasonality.

Figure 4: Charts showing deliveries of sand and gravel, not seasonally adjusted (left) and seasonally adjusted (right)



Source: Table 4, Monthly Statistics of Building Materials and Components



Source: Table 4, Monthly Statistics of Building Materials and Components

For each of the key data series, MAS produced SA methodologies:

- following best practice guidance
- for totals only. They did not provide seasonal adjustment methodologies for sub-components of the series. For example, the bricks series has sub-series for brick types, brick materials or region of production.

The X-12ARIMA seasonal adjustment package, which has been chosen from the many available seasonal adjustment methods as the standard one for use in official statistics in the United Kingdom (UK), was used to develop the methodologies.

BIS has access to X-13ARIMA-SEATS (which is the latest upgrade to X-12ARIMA) and wishes to begin producing and publishing SA data series for Bricks, Blocks, Sand & Gravel and Ready-Mixed Concrete deliveries. However, there are several decisions to make regarding the implementation of the SA methodologies and SA policy needs to be

established (see the [ONS/MAS review of building materials statistics: final report](#)² for detail on what decisions were taken during development of the SA methodologies).

MAS left these issues for BIS and the users of the Monthly Statistics of Building Materials and Components to decide on together, thus BIS would like to hear about user preferences on a number of dimensions for each data series. Users should note that seasonally adjusted data will be additional to what is currently published - we will continue to produce non-seasonally adjusted series.

Scope

MAS recommended that BIS begin by seasonally-adjusting the high level figures (ie total deliveries) and, once better practiced at producing these series, BIS should then consider seasonally adjusting the sub-series. For example, the bricks series has sub-series for brick types, brick materials or region of production. **Would users be happy for BIS to adopt this approach?**

Constraining to annual totals

BIS would like opinions on whether or not users would like BIS to constrain the annual totals so that SA annual totals equal non-SA annual totals (and whether these should be constrained on a financial or calendar year). There is no mathematical reason why the annual totals of a SA series should always equal the annual totals of the unadjusted series. BIS would opt not to constrain annual totals for the following reasons:

- Analysis by MAS (see [ONS/MAS review of building materials statistics: final report](#)²) found little apparent distortion caused by constraining the totals, with the differences between the constrained and unconstrained annual calendar totals being very small (typically around 0.3 - 0.5%).
- Constraining can cause more distortion in monthly/quarterly series where there are Trading Day Effects identified and corrected for. Trading Day Effects are caused by time periods - such as months, quarters or years - having differing numbers of each day of the week in them. Construction work tends to take place on weekdays rather than weekends, so for example, in a quarter that contains more weekdays than another quarter we might expect to see higher demand for material deliveries in the quarter containing more weekdays. Distortion is worse where there are Trading Day Effects because total Trading Day Effects over a year vary from year to year and are not expected to sum to zero, even approximately (unlike with seasonal factors). So it could be argued that constraining is rather unnatural.

The ESS (European Statistical System) Guideline on Seasonal Adjustment³ summarises the following disadvantages and advantages associated with constraining to annual totals:

² <https://www.gov.uk/government/publications/ons-mas-review-of-building-materials-statistics>

“The disadvantages in forcing equality over the year between the seasonally adjusted data and the raw data (e.g. sum or average) are:

- *Bias in the seasonally adjusted data, especially where calendar and other non-linear effects are relevant;*
- *The final seasonally adjusted data are not optimal;*
- *Additional post-processing calculations are required.*

The only benefit of the approach is that there is consistency over the year between adjusted and the not seasonally adjusted data. This can be of particular interest when low-frequency (eg annual) benchmarking figures officially exist (eg National Accounts, Balance of Payments, External Trade, etc) where users’ needs for time consistency are stronger.”

It is for these reasons that BIS is proposing that seasonally adjusted data are NOT constrained to annual totals but **we are aware that users may have reasons for preferring constrained totals, and, if anyone has this preference, we would like to know why.**

Revisions

A new data point added to a series can result in revisions to the whole of the seasonally adjusted series. It may not be desirable to revise the entire series (back as far as 1984 for Sand & Gravel and RMC, for example) each time a new data point is added (each month or quarter, depending on the material type).

Each data series could have its own revision policy, or some/all data series may share the same revision policy. BIS have identified three dimensions on which each revision policy may differ. Two of these relate to the revision of data whilst the other relates to review of the seasonal adjustment methodology. How these dimensions interact is also important.

Regarding revision of data:

1. *Scope* – what period of data will the revision policy apply to?

For example:

- The whole historical trend
- Just months/quarters in the latest year (the strategy for construction output is to revise current price survey data for 13 months and seasonal factors for 5 quarters)

2. *Schedule* – How often will data be revised? Will all data within scope for revision be revised at the same time or staggered, eg different data may be eligible for revision at each month/quarter of the year?

For example:

³ http://epp.eurostat.ec.europa.eu/portal/page/portal/national_accounts/documents/ESS_Guidelines_on_SA.pdf

- Revise the whole historical trend each time a new data point is added to the series
- Revise recent back data each time a new data point is added to the series and the full back series once a year
- Vary the revision schedule by period, eg Insolvency Service⁴ data has the following revisions policy for their SA strategy: at the same time as publishing Q1 data they revise data for the last three years, at the same time as publishing Q2 data they revise the current and last quarter, at the same time as publishing Q3 data they revise the current and last quarter, and at the same time as publishing Q4 data they revise a whole year's data.

Regarding review of the SA methodology:

3. *Frequency* - How often will the SA methodology be reviewed?

For example:

- Once a year eg in December (for calendar years)
- Once every three years eg in April (for financial years)

A possible policy, recommended by MAS, is during the year to revise back to the start of the last completed year, but when publishing data for December or Q4 (that completes the year) to open up the whole series for revision. This, they suggest, might be a suitable time to revisit the parameters of the seasonal adjustment (e.g. decide if the filters need to be changed). BIS has considered this policy for each data series and has proposed slightly different policies for each series. These are outlined under the following headings:

1. Bricks (Monthly)

Bricks data are published in 'provisional' and 'final' form for each month. Provisional data for a month is generally published two months in arrears, eg provisional data for July 2013 was published on 4 September 2013 (in the 'August 2013 edition tables'). More accurate and updated data are used to revise the 'provisional' figure one month later to give 'final' data, available three months in arrears, eg July 2013 'final' data was published on 2 October 2013.

Bricks data are published in tables 9 and 10 of the monthly tables. It is proposed that seasonally adjusted data will be published in a separate table alongside these tables.

Seasonal adjustment produces figures for the whole data series. For bricks, this is back to January 1983. Thus seasonal adjustment is largely produced based on the full trend of 'final' data, except for the latest data which are provisional. A new data point can result in revisions to the whole of the seasonally adjusted series (however these changes may be small). As such, if seasonal adjustment were ran each month then seasonally adjusted data would be available for each month in the series on a monthly basis. However, common practice with other seasonally adjusted data is to frequently revise a sub-set of recently published seasonally adjusted data (usually the previous few months/quarters) and to

⁴ <http://www.insolvencydirect.bis.gov.uk/otherinformation/statistics/revisions-policy.pdf>

revise other (older) data less frequently so that any changes (likely to be small) are made to the tables regularly.

BIS proposes that recent data, up to 12 months previous to any new data point, are eligible for revision caused by seasonal adjustment. For example, when seasonally adjusted data for June are published, data for June in the previous year to May in the current year are also revised. So this schedule would result in the publication of seasonally adjusted data for the last 13 months of the data series, regardless of whether data are 'final' or 'provisional'.

We also propose that the whole historical series should be eligible once a year for revision and that this is revised at the time when 'final' data that completes the series for each calendar year is published. For bricks, this will be around March as this is when 'final' monthly bricks data for December are due, at which point 'final' data for the whole year will be available. We propose to review the SA methodology for bricks at this time so that figures can be produced under any such revised methodology in time for the following release (April).

2. Concrete Blocks (Monthly)

Concrete blocks data are published in 'provisional' and 'final' form for each month. Provisional data are published for three consecutive months, after which point 'final' data for each month overwrite the provisional data. This three monthly cycle begins each January, April, July and October. Final data often become available for the first month following the three consecutive months (although sometimes 'final' data are published instead of the provisional data for the third month).

For example, provisional data for July are published in the edition of the tables published in November (as part of the 'October edition'). Provisional data for August are published the following month and provisional data for September are published the month after that (published in January). The cycle then restarts, with provisional October data published in February, however at the same time the provisional data for the previous three months (data for July, August and September) are revised with 'final' data.

Blocks data are published in tables 11 and 12 of the monthly tables. It is proposed that seasonally adjusted data will be published in a separate table alongside these tables.

Seasonal adjustment produces figures for the whole data series. For blocks, this is back to January 1983. Thus seasonal adjustment is largely produced based on the full trend of 'final' data, except for the latest data, of which one, two or three months are provisional (depending on the point in the cycle). A new data point can result in revisions to the whole of the seasonally adjusted series (however these changes may be small). As such, if seasonal adjustment were ran each month then seasonally adjusted data would be available for each month in the series on a monthly basis. However, common practice with other seasonally adjusted data is to frequently revise a sub-set of recently published seasonally adjusted data (usually the previous few months/quarters) and to revise other (generally older) data less frequently so that any changes (likely to be small) are made to the tables regularly.

BIS proposes that recent data, up to 12 months previous to any new data point, are eligible for revision caused by seasonal adjustment. For example, when seasonally adjusted data for June are published, data for June in the previous year to May in the current year are also revised. So this schedule would result in the publication of seasonally adjusted data for the last 13 months of the data series, regardless of whether data are 'final' or 'provisional'.

We also propose that the whole historical series should be eligible once a year for revision and that this is revised at the time when 'final' data that completes the series for each calendar year is published. For blocks, this will be around March as this is when 'final' monthly blocks data for December are due, at which point 'final' data for the whole year will be available. We propose to review the SA methodology for blocks at this time so that figures can be produced under any such revised methodology in time for the following release (April).

3. Ready-Mixed Concrete (Quarterly)

Ready-mix concrete (RMC) data are published once a quarter. Figures are not provisional and are rarely revised. Generally, data are published for each quarter two months after that quarter has ended. For example, data for 2012Q4 was published in February (as part of the 'January 2013 edition').

RMC data are published in table 13 of the monthly tables. It is proposed that seasonally adjusted data will be published alongside non-adjusted data in this table.

Seasonal adjustment produces figures for the whole data series. For RMC, this is back to Q1 1983. Thus seasonal adjustment is produced based on the full trend of 'final' data. A new data point can result in revisions to the whole of the seasonally adjusted series (however these changes may be small). As such, if seasonal adjustment were ran each quarter then seasonally adjusted data would be available for each quarter in the series on a quarterly basis. However, common practice with other seasonally adjusted data is to frequently revise a sub-set of recently published seasonally adjusted data (usually the previous few quarters) and to revise other (generally older) data less frequently so that any changes (likely to be small) are made to the tables regularly.

BIS proposes that recent data, up to 4 quarter previous to any new data point, are eligible for revision caused by seasonal adjustment. For example, when seasonally adjusted data for Q2 are published, data for Q2 of the previous year to Q1 of the current year are also revised. So this schedule would result in the publication of seasonally adjusted data for the last 5 quarters of the data series.

We also propose that the whole historical series should be eligible once a year for revision and that this is revised at the time when 'final' data that completes the series for each calendar year is published. For RMC, this will be around February as this is when data for Q4 are due each year, at which data for the whole year will be available. We propose to review the SA methodology for RMC at this time so that figures can be produced under any such revised methodology in time for the following release (March).

4. Sand & Gravel (Quarterly)

Sand and Gravel (S&G) data are published in 'provisional' and 'final' form for each quarter. Provisional data are published around three months after each quarter ends, so publication in March (for Q4), June (for Q1), September (for Q2) and December (for Q3). 'Final' data are published the following month, thus 'final' data are generally published in April (for Q4), July (for Q1), October (for Q2) and January (for Q3). S&G data are published in tables 4, 5 and 6 of the monthly tables. Each shows data for Total Sand and Gravel deliveries in Great Britain. It is proposed that seasonally adjusted data will be published alongside non-adjusted data in a separate table.

Seasonal adjustment produces figures for the whole data series. For S&G, this is back to Q1 1983. Thus seasonal adjustment is largely produced based on the full trend of 'final' data, except for four occasions a year where the latest data are provisional, until data are 'finalised' the following month. A new data point can result in revisions to the whole of the seasonally adjusted series (however these changes may be small). As such, if seasonal adjustment were ran for data for each quarter then seasonally adjusted data would be available twice for each quarter – once when data are provisional and once when data are 'final'. However, common practice with other seasonally adjusted data is to frequently revise a sub-set of recently published seasonally adjusted data (usually the previous few quarters) and to revise other (generally older) data less frequently so that any changes (likely to be small) are made to the tables regularly.

BIS proposes that recent data, up to 4 quarter previous to any new data point, are eligible for revision caused by seasonal adjustment. For example, when seasonally adjusted data for Q2 are published, data for Q2 of the previous year to Q1 of the current year are also revised. So this schedule would result in the publication of seasonally adjusted data for the last 5 quarters of the data series.

We also propose that the whole historical series should be eligible once a year for revision and that this is revised at the time when 'final' data that completes the series for each calendar year is published. For S&G, this will be around April as this is when 'final' data for Q4 are due each year, at which data for the whole year will be available. We propose to review the SA methodology for S&G at this time so that figures can be produced under any such revised methodology in time for the following release (May).

BIS would like to hear from users of each data series about whether they are happy with these proposals or what their preferences are concerning the three dimensions outlined (scope and schedule of regarding revisions to data and frequency regarding revisions to the SA methodology).

Presentation

Lastly, BIS would like to know how users would like SA data series to be presented. Four choices have been identified:

- Provider users with non-SA data tables
- Provider users with SA data tables
- Provide users with non-SA line charts
- Provide users with SA line charts

BIS proposes to continue to provide non-SA data alongside SA data but only provide charts for SA data (i.e. drop the non-SA charts). BIS would like to hear from users about whether this suits their needs and if they have need for data presented in any other way.

2. How to respond

1. When responding please state whether you are responding as an individual or representing the views of an organisation. If you are responding on behalf of an organisation, please make it clear who the organisation represents by selecting the appropriate interest group on the consultation form and, where applicable, how the views of members were assembled.
2. You can reply to this consultation online at:
<https://www.surveymonkey.com/s/materialstatsSA>
3. A list of those organisations and individuals consulted is in Annex B. We would welcome suggestions of others who may wish to be involved in this consultation process.
4. Under new Cabinet Office guidance consultations are now digital by default. Consultation responses should be made online, however if you wish to respond in another way then please contact:

James Liley
Statistical Analysis
Department of Business, Innovation and Skills
1 Victoria Street
SW1H 0ET
Tel: +44 (0)20 7215 6221
Email: Material.Stats@bis.gsi.gov.uk

5. Other versions of the document in Braille, other languages or audio-cassette are available on request.

3. Confidentiality & Data Protection

6. Information provided in response to this consultation, including personal information, may be subject to publication or release to other parties or to disclosure in accordance with the access to information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA) and the Environmental

Information Regulations 2004). If you want information, including personal data that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

7. In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

4. Help with queries

8. Questions about any statistical issues raised in the document can be addressed to:

James Liley
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5th floor, Spur 1
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London
SW1H 0ET

Tel: +44 (0)20 7215 6221
Email: Material.Stats@bis.gsi.gov.uk

The consultation principles are in Annex A.

Annex A: Consultation principles

The principles that Government departments and other public bodies should adopt for engaging stakeholders when developing policy and legislation are set out in the consultation principles.

<http://www.cabinetoffice.gov.uk/sites/default/files/resources/Consultation-Principles.pdf>

Comments or complaints on the conduct of this consultation

If you wish to comment on the conduct of this consultation or make a complaint about the way this consultation has been conducted, please write to:

John Conway,
BIS Consultation Co-ordinator,
1 Victoria Street,
London
SW1H 0ET

Telephone John on 020 7215 6402
or e-mail to: john.conway@bis.gsi.gov.uk

However if you wish to comment on the specific policy proposals you should contact the policy lead (see section 6).

Annex B: List of Individuals/Organisations consulted

Name	Organisation
Alberto De Biasio	AECOM
David Crosthwaite	AECOM
David Holmes	AECOM
Jim Meikle	AECOM
Maren Baldauf-Cunnington	AECOM
Stefani Kostagianni	AECOM
Adam Valentine	Barbour ABI
Michael Dall	Barbour ABI
Steve Shelley	Barbour ABI
Bob Packham	BPA consult
Brian Green	Brian Green Media
Cosmas Kamasho	Building Cost Information Service (BCIS)
Ian Pegg	Building Cost Information Service (BCIS)
Joe Martin	Building Cost Information Service (BCIS)
Peter Rumble	Building Cost Information Service (BCIS)
Robert Dent	Building Cost Information Service (BCIS)
Sue White	Building Cost Information Service (BCIS)
David Garwood	Building Services Research and Information Association (BSRIA)
Alasdair Reisner	Civil Engineering Contractors Association (CECA)
Lucy Thornycroft	Confederation of British Industry (CBI)
Karen Hazelden	Construction Industry Training Board (CITB)
Les Bryer	Construction Industry Training Board (CITB)
Kallum Pickering	Construction Products Association (CPA)
Noble Francis	Construction Products Association (CPA)
Anna Fialko	Department for Business, Innovation and Skills (BIS) economist
Helen Sleight	Department for Communities and Local Government (DCLG)
Neil Higgins	Department for Communities and Local Government (DCLG)
Paul Jackson	Electrical Contractors' Association (ECA)
James Hastings	Experian
Sonya Patel	Experian
Peter O'Connell	Federation of Master Builders (FMB)
Allan Wilen	Glenigan
Robert Davis	Glenigan
Bethan Slater	Health and Safety Executive (HSE)
Robert Tunnicliffe	Health and Safety Executive (HSE)
Stephen Wright	Health and Safety Executive (HSE)
Alan Couzens	HM Treasury
John Appleton	HM Treasury
John Stewart	Home Builders Federation
Jerry McLaughlin	Mineral Products Association (MPA)
Alex McKenna	National Federation of Builders (NFB)
Ian Murdoch	National Specialist Contractors Council (NSCC) & University of Westminster
Anna Davies	Office for National Statistics (ONS)

Jacqui Jones	Office for National Statistics (ONS)
Kate Davies	Office for National Statistics (ONS)
Pete Lee	Office for National Statistics (ONS)
Alex Murray	University College London (UCL)
Marco Yu	University College London (UCL)
Les Ruddock	University of Salford
Stephen Gruneberg	University of Westminster
Ian Maclean	Business & Trade Statistics Ltd

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