



Seasonal adjustment: 2014 update

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This regular article reports on the annual review carried out in 2013 of the seasonal adjustment of the Bank of England’s money and credit data and other series, as well as providing an update on other seasonal adjustment workstreams. The Bank plans to change its seasonal adjustment package from X-12-ARIMA to X-13ARIMA-SEATS with effect from May 2014 data.

Introduction

Seasonal adjustment aims to identify, estimate and remove regular seasonal fluctuations and typical calendar effects (e.g. numbers of trading days in a month) from time series data. This article provides an update of ongoing work and includes three parts. The first part describes the 2013 annual review process and summarises its results. The second part announces plans to change the seasonal adjustment package from X-12-ARIMA to X-13ARIMA-SEATS, with effect from next month (May 2014 data). The third part provides an update on other seasonal adjustment workstreams.

Annual Review Process

The Bank of England reviews the seasonal adjustment settings for selected series on an annual basis. The review is divided into three phases spread across the year, as detailed in Table 1.

Overall, 187 series were reviewed in 2013, as shown in Table 2.

Table 1: Phases of the 2013 review

Phase	Type of series covered	Period reviewed
1	Broad money and credit, notes and coin	Data up to January 2013 (implemented May 2013)
2	Balance sheet, industry analysis of deposits and loans, capital issuance, housing equity withdrawal and other series	Data up to May 2013 (implemented September 2013)
3	Lending to individuals	Data up to September 2013 (implemented January 2014)

Table 2: Summary of results of 2013 annual review

Number of series reviewed	187
Seasonal series – settings reviewed (this includes reviewing whether the series should still be seasonally adjusted)	125
Non-seasonal series reviewed for seasonality	46
Indirectly adjusted series reviewed for residual seasonality	16

For each data series reviewed, the following issues were considered:

- presence of seasonality;
- seasonal adjustment settings:
 - choice of ARIMA model;
 - calendar effects;

- outliers;
- seasonal and trend filters;
- effects of 2002 Golden Jubilee and 2012 Diamond Jubilee (reviewed in phases 1 and 2 for the first time);¹ and
- direct versus indirect adjustment structure (selected series only).²

Of the 187 series reviewed, settings were changed for 55 series. All changes were introduced in the months following the end of the review phase (May 2013, September 2013 and January 2014). Table 3 presents a summary of the changes.

Table 3: Summary of changes made during the 2013 annual review

Total number of series changed	55
Changed from seasonal to non-seasonal	1 ³
Changed from non-seasonal to seasonal	1 ⁴
Seasonal adjustment settings changed	53
Direct/Indirect adjustment structure changed	0

Change to X-13ARIMA-SEATS

The Bank of England adopted X-12-ARIMA in 2004.⁵

X-13ARIMA-SEATS⁶ is the latest in the family of seasonal adjustment methods that have been developed over several decades by the US Census Bureau (USCB) and Statistics Canada. It

¹ For further details, see 'Seasonal adjustment: Effects of the 2012 Diamond Jubilee', by Jenny Owladi, *Bank of England Bankstats (Monetary & Financial Statistics)*, January 2013, available at: www.bankofengland.co.uk/statistics/Documents/ms/articles/art3jan13.pdf

² Some series can be adjusted either directly or indirectly (as the sum, or less frequently the difference, of their seasonally adjusted components). The method chosen depends on various properties of the series and its components, and the relationships between these. The Bank continues to monitor the adjustment structures of key series to ensure that these remain appropriate.

³ This series is unpublished.

⁴ This series is unpublished.

⁵ See 'Changes of seasonal adjustment method to X-12-ARIMA', by John Thorp, *Bank of England Bankstats (Monetary & Financial Statistics)*, December 2003, available at:

www.bankofengland.co.uk/statistics/Documents/ms/articles/artdec03.pdf

⁶ For more details, see www.census.gov/srd/www/x13as/.

combines the X-12-ARIMA and SEATS programs into one package.⁷

The Bank participated in the Government Statistical Service (GSS) Task Force on evaluating X-13ARIMA-SEATS in 2011. The Taskforce recommended that GSS members (which include the Office for National Statistics but not the Bank) begin to use X-13ARIMA-SEATS. The Bank announced its intention, in April 2013, to switch to X-13ARIMA-SEATS during 2014.⁸

In the intervening period, the Bank has tested the switch to X-13ARIMA-SEATS to determine the impact on outputs and found the differences to be immaterial.

X-13ARIMA-SEATS will be applied to all series currently being seasonally adjusted within X12. Historical series no longer updated will not switch to X-13ARIMA-SEATS.

Next steps

The Bank will investigate the new functionality available within X-13ARIMA-SEATS and implement changes to series where warranted.

Other workstreams

In addition to the regular review process, the Bank also conducts more specific work on issues relating to seasonal adjustment:

- The Bank made changes to the seasonal adjustment of M4 excluding intermediate other financial corporations (OFCs) (M4^{ex}).⁹ A review of the seasonal adjustment of non-

⁷ For more details on SEATS, see Gomez, V. and Maravell, A. (1997), 'Programs TRAMO (Time series Regression with ARIMA noise, Missing values, and Outliers) and SEATS (Signal Extraction in ARIMA Time Series): Instructions for the User', *Working paper 9628*, Servicio de Estudios, Banco de Espana.

⁸ See 'Our work programme in monetary and financial statistics – April 2013', by Jonathan Bailey and Jenny Owladi, *Bank of England Bankstats (Monetary and Financial Statistics)*, April 2013, available at: www.bankofengland.co.uk/statistics/Documents/ms/articles/art1apr13.pdf.

⁹ For further details, see 'Modifications to the seasonally adjusted measures of M4 and M4 lending excluding intermediate OFCs', by Rajveer Berar and Ross Meader, *Bank of England Bankstats (Monetary & Financial Statistics)*, October 2013, available at:

www.bankofengland.co.uk/statistics/Documents/ms/articles/art1oct13.pdf

intermediate OFCs' M4 and M4 lending was conducted to determine whether these short series could now be seasonally adjusted using standard methods. It was decided that the seasonal adjustment of non-intermediate OFCs' M4 would be carried out using standard methodology, while the seasonal adjustment of non-intermediate OFCs' M4 lending would cease.

- The Bank is reviewing the seasonal adjustment of narrow money (notes and coin). A change in the reporting of notes and coin in relation to the days of the week on which Bank Holidays fall is affecting the pattern of trading day factors, which is impacting on the quality of the seasonal adjustment of these series.