

Seasonal adjustment: 2009 annual review

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This article is the latest in an annual series reviewing the seasonal adjustment of the Bank of England's published series. It outlines the scope of the review and summarises the changes made. In addition, it introduces seasonally adjusted series for Table A5.5 - Monthly Lending Secured on Dwellings: Repayments.

Introduction

The Bank recently published its *Data Quality Framework*¹ which sets out the Bank's approach to meeting international quality standards for statistics. Comparability of data over time is enhanced through the application of seasonal adjustment methods and the Bank continues to conduct reviews of the seasonal adjustment settings of all of its monetary data series to ensure these remain satisfactory.

Seasonal adjustment aims to identify, estimate and remove regular seasonal fluctuations and typical calendar effects (e.g. trading day) within the movements of the time series under review. Regular seasonal fluctuations mean those movements which recur with similar intensity in the same season each year and which, on the basis of the past movements of the time series in question, can under normal circumstances be expected to recur.

The 2009 Annual Review

The 2009 review focussed on:

- Series that appear on the Bank's statistical releases, including those currently classed as non-seasonal;
- A selection of less prominent series where X-12-ARIMA diagnostic tests indicated that the existing seasonal adjustments could be refined in some way; and
- A review of the method of seasonal adjustment for *M4 (net) Lending to the Household Sector*.

A larger number of series than in the past were reviewed this year partly as a consequence of reviewing more non-seasonal series but also because a change in settings for a particular series may have merited a review of related series. As discussed below, new series have been introduced in this publication following the decision to begin seasonally adjusting the Lending secured on dwellings (Repayments) series.

A total of 145 series² were reviewed this year and as in the past, the following issues were considered:

- presence of seasonality;
- ARIMA model;
- calendar regressors e.g. trading day;
- outliers; and
- seasonal and trend filters lengths.

¹ See <http://www.bankofengland.co.uk/statistics/about/dqf.pdf>

² Some of these series are non-published internal series which do not appear on the Bank's Statistical Interactive Database

Table 1: Annual Review Summary

Change	Number of series
No changes	30
Changed from seasonal to non-seasonal	3
Changed from non-seasonal to seasonal	16
ARIMA model changed	64
Outliers changed	63
Trading day variables added	33
Trading day variables removed	1
Easter effect variable added	22
Easter effect variable removed	0
Other regressor variable ^(a) added	20
Other regressor variable removed	1
Changes to trend or seasonal filters	44

^(a)Other regressor variables include a Jubilee effect regressor that adjusts for the impact of the move of the late May Bank Holiday and the creation of a one-off new Bank Holiday in June 2002 to mark the Queen's Golden Jubilee.

Table 1 summarises the main changes following the review. Thirty series had their settings left unchanged and a significant number of changes were warranted partly reflecting the decision to begin seasonally adjusting the *Lending secured on dwellings (Repayments)* series. A change to the method of adjustment for *M4 (net) lending to the Household sector* is also documented below. These changes have been introduced in the current edition of this publication when data for March 2009 are first published.

Introduction of seasonally adjusted data in Table A5.5 – Monthly Lending Secured on Dwellings: Repayments

Analysis of the 16 series in this table shows that 14 exhibit seasonality. As a result, these series will from now on be seasonally adjusted and have been added to Table A5.5. The Table splits these repayments by type (regular, on redemption, and other lump sum) and by lender (banks, building societies and other specialist lenders). Totals, including a gross total, by type and lender are also presented.

X-12-ARIMA's statistical procedures, including F tests and a spectral diagnostic, were used to detect seasonality and significant calendar effects e.g. trading day. The quality of the seasonal adjustment is satisfactory with no residual seasonality present in either component or aggregate series. Two series: *Other Specialist Lenders regular repayments* and *Other Specialist Lenders other lump sum* did not exhibit seasonality. These series will,

however, be reviewed for seasonality regularly along with all other series.

M4 (net) Lending to Household Sector

The sectoral split of *M4 Lending* (a counterpart to the broad money aggregate M4) includes the *M4 (net) Lending to Household Sector* aggregate. Since 2004, when the Bank changed seasonal adjustment methods³, the *M4 (net) Lending to Household sector* aggregate has been directly adjusted.

When a time series is constructed as the sum (or other composite) of a set of component series, the seasonally adjusted total series can be obtained by summing the individually seasonally adjusted components. This kind of adjustment is known as an *indirect adjustment* of the aggregate series. The alternative is *direct adjustment* which is found by seasonally adjusting the aggregate series. Direct adjustment is generally of better quality than the alternative indirect adjustment when the component series are noisy but display similar seasonal patterns. An indirect adjustment is usually of better quality than the direct adjustment when the component series have quite distinct seasonal patterns or when the proportion of the total that a component accounts for changes over time. Generally the direct and indirect adjustment will not coincide and the Bank publishes a residual series, on the Statistical Interactive Database, when an aggregate total is directly adjusted.

Lending to Households (excluding securitisations and loan transfers) series the indirect approach will be adopted now.

X-12-ARIMA updates and future reviews

The United States Census Bureau (USCB) shortly plan to release an X-13A-S test package to interested parties including the Bank and the UK’s Office for National Statistics (ONS). The Bank will participate in a Government Statistical Service (GSS) Task Force to evaluate the impact of the new package on published data.

The Bank will continue to routinely monitor the seasonal adjustment performance of its monetary series and document significant changes in this publication.

Chart 1: Aggregation structure of M4 Lending to Household

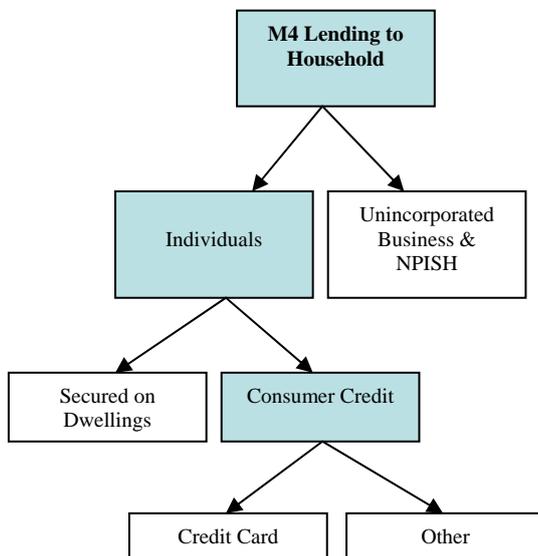


Chart 1 shows how components (some of these in turn having their own sub-components) combine to give the *M4 Lending to the Household sector* series. Each of the totals (shaded) can be derived using either a direct or indirect adjustment.

Analysis showed that both the direct and indirect methods yielded satisfactory results: no residual seasonal or calendar effects, and an absence of bias in the level of the series. To bring consistency with the analogous *M4*

³ See <http://www.bankofengland.co.uk/statistics/ms/articles/artdec03.pdf>