Seasonal adjustment of M4 excluding intermediate OFCs ($M4^{ex}$) – an update

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In September this publication detailed the results of the Bank of England's investigations into alternative approaches to compiling seasonally adjusted data for M4 excluding the deposits of intermediate other financial corporations ($M4^{ex}$) and proposed a change to the quarterly seasonal adjustment method, which was implemented last month. This follow up article informs users of subsequent changes to relevant monthly series on both the money and lending sides, which arise as a consequence. There is an insufficient length of monthly non-intermediate OFCs' M4 data to adjust this using the usual seasonal adjustment method. Instead, an estimate of seasonally adjusted NIOFCs will be obtained using quarterly seasonal factors and historic monthly factors. The seasonal adjustment of the monthly series will continue to be under review.

Background

An article in the September 2010 edition of *Bankstats*[1] outlined a change in the seasonal adjustment methodology of quarterly M4 excluding intermediate other financial corporations ($M4^{ex}$) and its lending counterpart $M4Lx^{ex}$. $M4^{ex}$ will be obtained using an indirect-by-summation approach as opposed to the previous indirect-by-subtraction method. Specifically, seasonally adjusted quarterly $M4^{ex}$ will be derived as:

$$M4^{ex}_{SA} = M4^{HH}_{SA} + M4^{PNFC}_{SA} + M4^{NIOFC}_{SA}$$

where seasonally adjusted households' M4 $\left(M4^{HH}_{SA}\right)$, private non-financial corporations' M4 $\left(M4^{PNFC}_{SA}\right)$ and non-intermediate other financial corporations' M4 $\left(M4^{NIOFC}_{SA}\right)$ are summed together.

A re-appraisal of the seasonal adjustment method was driven by an increase in the volatility of IOFCs' M4 in recent years. This increase in volatility has impacted on the seasonal adjustment of M4 and OFCs' M4, so that the previous indirect-by-subtraction measure has become less robust.

This article outlines changes to the monthly seasonal adjustment of $M4^{ex}$ and associated series that arise in consequence to changes to the seasonal adjustment method of quarterly $M4^{ex}$.

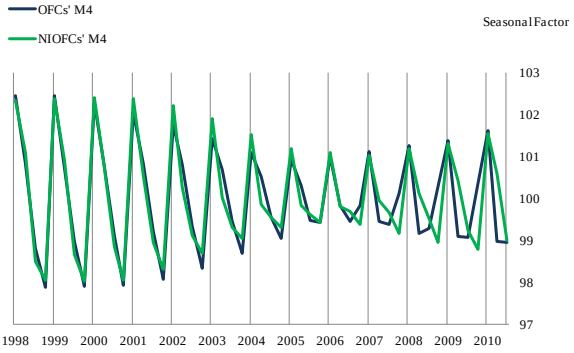
An estimate of NIOFCs' M4

The September article explained that quarterly $M4^{ex}$, and associated series, would be adjusted using the indirect-by-summation approach, a move away from the current indirect-by-subtraction approach.

Ideally this approach would simply be applied across to the monthly data. However due to an insufficient length of monthly NIOFCs' M4 data (this series is available from June 2009 onwards) it is not possible to seasonally adjust monthly NIOFCs data by standard techniques.[2] Instead, an estimate of the seasonally adjusted data will be obtained using the following method:

- For end-quarter months, the quarterly NIOFC factors will be applied to the non-seasonally adjusted NIOFC data; and
- For within-quarter months, historic OFC seasonal factors will be applied (Chart A shows OFC and NIOFC quarterly seasonal factors over time).

CHART A: Seasonal factors of quarterly levels of OFCs' M4 and NIOFCs' M4 at 2010Q3



Our general method for obtaining quarterly seasonally adjusted levels data is to use end-quarter seasonally adjusted monthly levels. For example, the 2010 Q3 seasonally adjusted level is set to equal the September 2010 seasonally adjusted level. This principle is used here where the end-quarter monthly NIOFCs' level will be set to equal the seasonally adjusted quarterly level. For within-quarter months, however, NIOFC's M4 will

[1] 'Seasonal adjustment of quarterly M4 excluding intermediate OFCs ($M4^{ex}$)', by Fida Hussain and Fenella Maitland-Smith, *Bank of England Monetary & Financial Statistics*, September 2010. http://www.bankofengland.co.uk/statistics/ms/articles/art1sep10.pdf.

[2] The Bank's standard technique for seasonal adjustment is to use the X-12-ARIMA software package which requires a minimum of three years of observations to be able to seasonally adjust.

be derived using historic (average pre-2005) OFC seasonal factors since the seasonal pattern of NIOFCs mirrors the pattern of OFCs closely over this period, as shown in Chart A above.

Charts B and C present the three-month annualised growth rates for the new estimates of NIOFCs' M4 and $M4^{ex}$ respectively, alongside the one-quarter annualised growth rate derived from quarterly data.

CHART B: Comparison of growth rates for NIOFCs' M4

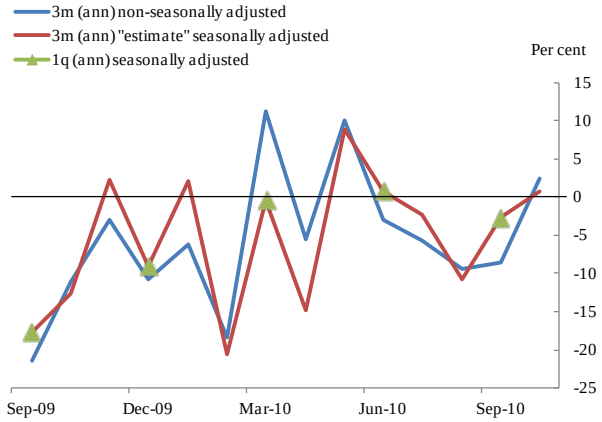
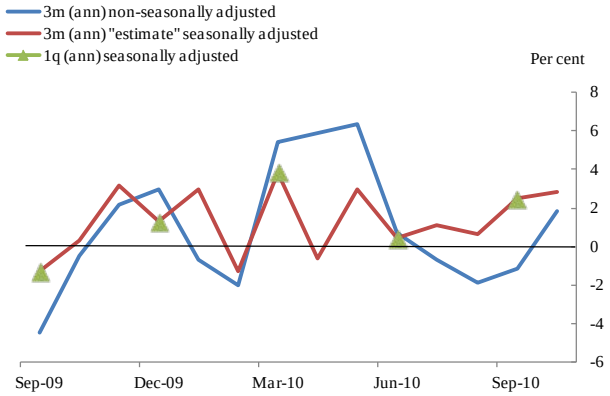


CHART C: Comparison of growth rates for $M4^{ex}$



Implications for other published series

The *Sectoral breakdown of aggregate M4 and M4 lending* statistical release will focus on the quarterly $M4^{ex}$ and $M4Lx^{ex}$ data where possible, but will include the monthly estimates where these are more timely.

Monthly OFCs' M4 will also be adjusted using the indirect-by-summation approach as far back as possible. Prior to 1998 and for within-quarter months between December 1997 and June 2009, the direct adjustment method will be used. For end-quarter months from December 1997 onwards the quarterly seasonal factor will be obtained from the indirect-by-summation method and applied to the unadjusted data. From June 2009 onwards OFCs' M4 is the sum of NIOFC's M4 estimate plus non-seasonally adjusted IOFCs, ie $M4^{NIOFC}_{(SA)} + M4^{IOFC}_{NSA}$.

Similarly, M4 (and M4Lx) will be adjusted as far back as possible – to July 1996 – using the indirect-by-summation approach.

An annex to this article provides a detailed account of the changes for the affected series. These changes take effect from the date of this publication.

As previously highlighted, quarterly NIOFCs' M4 is adjusted in its own right and without reference to the monthly estimate series. Whilst end-quarter monthly data use quarterly seasonal factors where available, the quarterly and three-monthly annualised growth rates at end-quarters will not always be identical and will be published in their own right. This will also affect associated series for OFCs and M4.

Conclusions

This article presents the Bank's treatment of the seasonal adjustment of monthly $M4^{ex}$ data, which is obtained using an estimate of NIOFCs' M4 given that seasonal adjustment by standard techniques cannot be done at this stage. In this sense, the seasonally adjusted monthly $M4^{ex}$ data are themselves estimates.

The seasonal adjustment of monthly NIOFCs' M4 will continue to be reviewed and it is planned that when an adequate length of data series is available, we will revert to standard seasonal adjustment techniques for this series.

Seasonal adjustment of stock series and break-adjustments

The principles used to seasonally adjust these stock (or amounts outstanding levels) time series are outlined in the following link. The methodology employs the use of adjustments that capture and remove changes between successive amounts outstanding that are attributable to other changes in the volume of assets, as defined under European System of Accounts 1995 (ESA 1995). Such changes include for example, changes in the reporting population and foreign currency revaluation adjustments. These adjustments allow users to calculate a long-run break adjusted series.

Annex: Summary of changes made to seasonal adjustment of $M4^{ex}$ ($M4Lx^{ex}$) and related series

The following tables present the changes made to $M4^{ex}$ and related series (an analogous Lending side table is also presented). The non-seasonally adjusted (NSA) and seasonally adjusted (SA) IADB codes are presented, for both level and flow domains. The Statistical Interactive Database can be accessed via the following link: http://www.bankofengland.co.uk/mfsd/iadb/NewIntermed.asp.

Table 1: Changes to seasonal adjustment for $M4^{ex}$ and associated series

Series		Monthly	Quarterly
$M4^{ex}$	Was	Indirect-by-subtraction $M4_{SA} - M4^{IOFC}_{NSA}$	Indirect-by-subtraction $M4_{SA} - M4^{IOFC}_{NSA}$
	Now	Indirect-by-summation $M4^{HH}_{SA} + M4^{PNFC}_{SA} + M4^{NIOFC}_{(SA)}$ NSA level Code: RPMB3DQ NSA flow Code: RPMB3DS SA level Code: RPMB53Q SA flow Code: RPMB54Q	Indirect-by-summation $M4^{HH}_{SA} + M4^{PNFC}_{SA} + M4^{NIOFC}_{SA}$ NSA level Code: RPQB3DQ NSA flow Code: RPQB3DS SA level Code: RPQB53Q SA flow Code : RPQB54Q
M4	Was	Direct $M4_{SA}$	Direct $M4_{SA}$
	Now	Indirect-by-summation $M4^{HH}_{SA} + M4^{PNFC}_{SA} + M4^{IOFC}_{NSA} + M4^{NIOFC}_{(SA)}$ where NIOFC is a seasonal adjustment "estimate". NSA level Code: LPMAUYM NSA flow Code: LPMAUZI SA level Code: LPMAUYN SA flow Code: LPMAUZJ	Indirect-by-summation[a] $M4^{HH}_{SA} + M4^{PNFC}_{SA} + M4^{IOFC}_{NSA} + M4^{NIOFC}_{SA}$ NSA level Code: LPQAUYM NSA flow Code: LPQAUZI SA level Code: LPQAUYN SA flow Code: LPQAUZJ
NIOFCs	Was	Indirect-by-subtraction $M4_{SA} - M4^{PNFC}_{SA} - M4^{HH}_{SA} - M4^{IOFC}_{NSA}$	Indirect-by-subtraction $M4_{SA} - M4^{PNFC}_{SA} - M4^{HH}_{SA} - M4^{IOFC}_{NSA}$
	Now	"Estimate" compiled from using quarterly NIOFCs seasonal factor for end-quarter months. For within-quarter months, the average historic OFC monthly seasonal factors (calculated from Jan 1998-Dec 2004) is used. NSA level Code: RPMB3DY NSA flow Code: RPMB3E5 SA level Code: RPMB63Q SA flow Code: RPMB64Q	Direct adjustment $M4^{NIOFC}_{SA}$ NSA level Code: RPQB3DY NSA flow Code: RPQB3E5 SA level Code: RPQB63Q SA flow Code: RPQB64Q

Notes:
[a] Quarterly M4 data are available from 1963 Q2 onwards. 1963 Q2-1982 Q2 M4 data are seasonally adjusted by pure quarterly means and are not revised.

Table 2: Changes to seasonal adjustment for M4Lx[ex] and associated series

Series		Monthly	Quarterly
M4Lx[ex]	Was	Indirect-by-subtraction $M4Lx_{SA} - M4Lx_{NSA}^{IOFC}$	Indirect-by-subtraction $M4Lx_{SA} - M4Lx_{NSA}^{IOFC}$
	Now	Indirect-by-summation $M4Lx_{SA}^{HH} + M4Lx_{SA}^{PNFC} + M4Lx_{(SA)}^{NIOFC}$ NSA level Code: RPMB3DR NSA flow Code: RPMB3DT SA level Code: RPMB57Q SA flow Code: RPMB58Q	Indirect-by-summation $M4Lx_{SA}^{HH} + M4Lx_{SA}^{PNFC} + M4Lx_{SA}^{NIOFC}$ NSA level Code: RPQB3DR NSA flow Code: RPQB3DT SA level Code: RPQB57Q SA flow Code: RPQB58Q
M4Lx	Was	Direct $M4Lx_{SA}$	Direct $M4Lx_{SA}$
	Now	Indirect-by-summation $M4Lx_{SA}^{HH} + M4Lx_{SA}^{PNFC} + M4Lx_{NSA}^{IOFC} + M4Lx_{(SA)}^{NIOFC}$ where NIOFC is a seasonal adjustment "estimate". NSA level Code: LPMBF36 NSA flow Code: LPMBF37 SA level Code: LPMBC69 SA flow Code: LPMVWVL	Indirect-by-summation[a] $M4Lx_{SA}^{HH} + M4Lx_{SA}^{PNFC} + M4Lx_{NSA}^{IOFC} + M4Lx_{SA}^{NIOFC}$ NSA level Code: LPQBF36 NSA flow Code: LPQBF37 SA level Code: LPQBC69 SA flow Code: LPQVWVL
NIOFCs	Was	Indirect-by-subtraction $M4Lx_{SA} - M4Lx_{SA}^{PNFC} - M4Lx_{SA}^{HH} - M4Lx_{NSA}^{IOFC}$	Indirect-by-subtraction $M4Lx_{SA} - M4Lx_{SA}^{PNFC} - M4Lx_{SA}^{HH} - M4Lx_{NSA}^{IOFC}$
	Now	"Estimate" compiled from using quarterly NIOFCs seasonal factor for end-quarter months. For within-quarter months, the average historic OFC monthly seasonal factors (calculated from Jan 1998-Dec 2004) is used. NSA level Code: RPMB3E3 NSA flow Code: RPMB3E7 SA level Code: RPMB67Q SA flow Code: RPMB68Q	Direct adjustment $M4Lx_{SA}^{NIOFC}$ NSA level Code: RPQB3E3 NSA flow Code: RPQB3E7 SA level Code: RPQB67Q SA flow Code: RPQB68Q

See Table 1 for associated notes.