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## 1989 annual update of seasonal adjustments

*This note describes the main methodological changes made as a result of the latest annual review of the seasonal adjustments on the monetary aggregates and other financial series. The revised adjustments were first introduced in the release of the provisional monetary aggregates for October 1989 and are incorporated in the statistics in this issue of the Bulletin.<sup>(1)</sup>*

### **M0: a change of method**

Seasonal adjustment of weekly recorded data such as the note circulation (and thus M0) presents difficult statistical problems. Although seasonality is by definition an annual phenomenon, observations made on a particular day of the week do not fall on the same date each year. Also, bank holidays have a very strong influence on the note circulation and, although the holidays are not all fixed at precise points in the year, users expect the 'seasonal' adjustments to remove their effect. In addition, the number of weekly (Wednesday) observations in a year varies between 52 and 53. These difficulties prevent the use of standard seasonal adjustment techniques. Instead, an estimate of the seasonal pattern is constructed using least-squares regression, tailored to match the oddities of the calendar. Seasonal adjustment of the original series is then achieved by subtraction of the estimated pattern.<sup>(2)</sup>

In general, statistical estimates are most reliable when based upon as many observations as possible, which in the context of the estimation of seasonality means that a run of data covering several years is necessary. More years are required to distinguish between patterns arising from holidays which (like Easter) do not fall on a fixed day of the year and the basic seasonal pattern. However, to derive estimates of such patterns from several years of data presupposes that the patterns remain uniform throughout, which conflicts with the tendency of patterns of behaviour reflected in economic data to change over time.

The seasonal adjustments in use until now assumed that the shape of the seasonal pattern in M0 through the year remained essentially constant, and that its amplitude grew in proportion to the underlying level of the series. This assumption reflected a belief that notes and coin continued to be used in much the same manner from year to year, while the value of transactions was scaled up according to the quantity of notes and coin in circulation. This meant that, after constructing a trend curve using a moving average, the remaining variations could be reduced to a constant size ('normalised') by dividing the series by the trend at each point.

Regression estimation of a normalised seasonal pattern could then be applied over the entire series, with the final estimates of the values of the pattern being obtained by scaling the normalised pattern according to the value of the trend in each period. For example, the size of the Christmas peak in the note circulation was estimated to be a constant 10% higher than the underlying trend in the series; this translated into an effect which grew from £0.9 billion at Christmas 1978 to £1.4 billion at Christmas 1988.

However, during the past few years it became increasingly clear that the proportionality assumption no longer applied. In fact, growth in the seasonal pattern exceeded that expected to result from the rising trend level, particularly in the period around Christmas. Moreover, there have been changes in some aspects of seasonal behaviour, such as a relative decline in the traditional summer peak (perhaps because more people have been taking their holidays abroad, or because holidays have become more dispersed throughout the year). In view of these developments it has been decided that the estimated seasonal pattern for any particular year should no longer be based upon as long a period of years as before. The estimate of the normalised pattern within each year is now derived (by essentially the same regression technique as before) mainly from a block of five years centred on the year in question, except for years too close to either end of the series to allow the formation of a complete five year block. Here, the estimate from the end block is applied to all three years nearest to the end of the series, and to the years within any forecast period. For example, the estimate of the seasonal pattern for 1988 is based on the block of data from 1984 to 1988 inclusive; the same pattern is assumed to apply in 1989 and 1990. A corollary of this is that the estimates of the seasonal pattern for the most recent years are more prone to revision in the annual updating exercise (as is true of all seasonal adjustment methods which permit the seasonal pattern to alter over time).

In summary, this new procedure allows the estimated seasonal pattern to evolve through time, and to reflect the recent growth in seasonal variations.

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(1) An earlier version of this note accompanied the monetary statistics press release of 29 November 1989.

(2) The construction of the M0 series (which is a monthly average of Wednesday observations) was described on page 78 of the March 1984 *Bulletin* and its conversion into a calendar month series on pages 521 and 522 of the December 1986 *Bulletin*. The fundamentals of the seasonal adjustment techniques which are used were described on page 425 of the December 1974 *Bulletin*.

## The broader aggregates

There are no changes of substance in the general method used to estimate seasonal adjustments on the broader monetary aggregates and their counterparts (and on the banking and building society series in Tables 6.1 and 6.2 and the financial series in the flow of funds matrix in Table 19 of the statistical annex).<sup>(1)</sup>

Thus the revisions to the adjustments in this update are the result of the use of one more year's data and some changes in the detail of the method. The changes of detail include:

- (a) a move towards estimating the adjustments at a more aggregated level: this enables the identification of seasonality which may be disguised in a more disaggregated approach because it is randomly distributed around the disaggregated elements, and also allows more information on seasonal movements to be extracted from the calendar monthly series (though because of the shortness of the calendar monthly series the adjustments have still to be based primarily on the quarterly figures, as explained on pages 521–2 of the December 1986 *Bulletin*);
- (b) a move away from deriving the adjustments for certain series from their relationship to the trend level, as this had been found to produce adjustments which grew too fast;
- (c) the substitution of stochastically derived adjustments for building society interest crediting in place of deterministic adjustments, in line with a recommendation of the working party report

mentioned earlier (see pages 88–9 of the February 1989 *Bulletin*). This means that the effects of both bank and building society interest flows are now dealt with purely by adjustments based on a moving average of past data. The seasonal adjustments do not seek, and should not be expected, to eliminate the impact of interest flows in periods when the stock of business on which interest is being credited or debited is growing unusually fast or slowly, or when interest rates are materially different from their average level in the period from which the seasonal adjustments are estimated. The series which are likely to be particularly affected are sterling bank lending to the M4 private sector and building societies' retail shares and deposits in M2 and M4: for example, in periods of historically high interest rates like the present, the seasonal adjustments will only partially smooth away the expansionary effect of quarterly interest charging on bank lending, and similarly the adjustments will not completely smooth away the boost imparted to building societies' shares and deposits in months when interest crediting is high (primarily January, June, July and December) or remove the depressing effect in months when crediting is low (particularly February, April, May, August, October and November: see 'interest credited to accounts' in Table 6.8 in the CSO's publication *Financial Statistics*). This characteristic applies less to other series, either because—in the case of building societies' sterling lending to the M4 private sector—the impact of interest flows is spread more evenly through the year or because—in the case of bank deposits in M2 and M4—the effects of interest credits and debits tend to offset each other.

(1) The method has been most recently described in the *Report of the Working Party on Seasonal Adjustment of the Monetary Aggregates*, issued by the Central Statistical Office in September 1988 (the Report's recommendations and the Bank's response were set out on pages 88–90 of the February 1989 *Bulletin*).