Seasonal adjustment of money and its counterparts

The seasonal adjustments for the banking monthly series of M_1, and sterling M_3 and its counterparts, were described in an article in the June 1978 Bulletin, *and certain changes of method in the June 1981* Bulletin. *The adjustments are not simply based on a moving average of past behaviour, but are linked to the adjustments for the central government borrowing requirement (CGBR), in order to reflect so far as possible the seasonal pattern of government revenue and expenditure in the most recent period. They are updated annually in the light of the latest available information.*[1] *This article describes some of the more significant changes made this year.*

The civil service strike in 1981

The strike had a substantial impact on government revenues and expenditures, notably disrupting the collection of income tax, national insurance contributions, and value added tax (VAT) and the payment of VAT rebates. Large distortions to the normal pattern of these three taxes occurred, mainly between March 1981 and April 1982, and there were corresponding distortions in other financial series, especially bank deposits and bank lending. At the time of the annual revision of the seasonal adjustments in 1982 the distortions associated with the strike had only partially been unwound, and it was decided that no use could then be made of the 1981 data. For this year's update, however, with the aid of more recent data, estimates have been made of the effects of the strike on the seasonal pattern of the CGBR, and of the corresponding effects on the seasonal patterns of bank deposits and bank lending. The strike effects have been calculated by constructing artificial series for all the affected seasonal components of the CGBR, covering the period March 1981 to April 1982; this enables the data before and after that period to be linked together, which is a necessary preliminary to the calculation of seasonal adjustments. The strike effects being themselves non-seasonal, are left as distortions within the final seasonally adjusted series.

Estimates of the strike effects on major taxes

The Inland Revenue and Customs and Excise have estimated that the net effect of the strike, from its start in March 1981 to the end of March 1982, was to delay about £1$\frac{1}{4}$ billion of receipts, mainly confined to three taxes: PAYE and national insurance contributions (about £$\frac{1}{2}$ billion) and VAT (about £$\frac{3}{4}$ billion). For other taxes the net delay in revenue over the whole period is thought to be small, although the monthly pattern was distorted. There appears to have been little impact on expenditure by government departments. Additional debt interest was incurred as a result of the tax delays, but this did not have a significant impact on the seasonal pattern. Recovery of tax arrears continued at a lower rate in 1982/83, but no estimate of the monthly path of tax recoveries in that period has been made.

For each tax, an artificial banking monthly series for the period March 1981 to April 1982 was calculated as follows. A trend was estimated during the period, consistent with the trend before and after it and with the recorded total during the period (for the three taxes with arrears, these were added to the recorded totals). The trend figures were combined with seasonal and make-up date factors estimated from the pre-strike period, to give a recreated 'unadjusted' series. The recreated series, in conjunction with the data before and after the period, was then used to re-estimate the seasonal pattern over the whole length of the series. The difference between recorded and recreated totals for Inland Revenue, national insurance contributions, and Customs and Excise gives a measure of the overall strike effect (Table A).

These adjustments, applied to the CGBR over the strike-affected period, gave a significant improvement in the smoothness of the series. They were also used to estimate strike effects on the seasonal patterns of other financial series, by treating the adjustments as a 'dummy variable' in a model of each series. Significant strike effects were found only in sterling bank lending to the private sector (to which 60% of the strike effect was allocated), and in non-interest-bearing sight deposits (to which 20% of the strike effect was allocated). Using a 'dummy variable' in this way implies that the relationship between the strike effects on the CGBR and on other financial series is fixed over time. This is unlikely to have been true, but it was not

Table A
Strike estimates for major tax components of the CGBR

£ millions; banking months
Shortfall in tax receipts −/catching up in tax receipts +

1981						
March	April	May	June	July	Aug.(a)	Sept.
−500	−1,300	−1,550	−1,050	−1,850	+900	−650
1981			1982			
Oct.	Nov.	Dec.	Jan.	Feb.	March	April
−300	+1,350	+1,450	+200	+700	+1,100	+300

(a) The catching up in August was largely due to the banking of cheques received in earlier months by Customs and Excise; VAT repayments and further delays in collections caused a reversion to shortfall in September/October.

(1) The latest revisions are incorporated in Table 11 of the statistical annex.

possible to detect more complicated relationships by statistical methods. Variants of the time profile of the strike effect were examined, and it was found that the seasonal adjustments were not at all sensitive to these. The unexplained 20% of the strike effect is presumed to be spread over a number of other financial series in a way that is not statistically detectable and does not affect their seasonal patterns.

Balancing adjustments

The 1978 article described how the seasonal adjustments estimated independently for each series of financial flows are balanced so that the seasonally adjusted data satisfy the same constraints as the unadjusted data.[1] A weight, representing the uncertainty of the estimated seasonal pattern, was attached to most series; this determined the amount by which the independently estimated seasonal adjustments for each series would be altered by the balancing process. The seasonal adjustments for the CGBR and certain other series were not altered by this process.

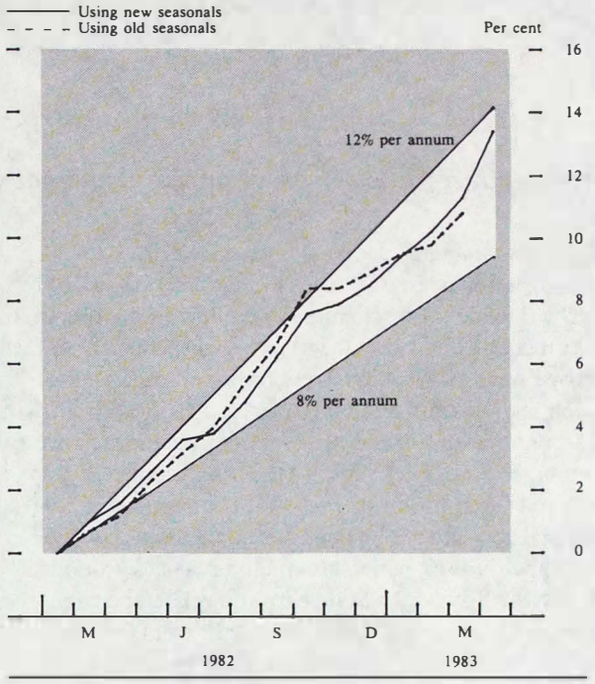
Research has been carried out this year on the effect of the balancing method on the smoothness of the seasonally adjusted series. An alternative system has been adopted in which the weights are chosen so that the balanced seasonally adjusted series are jointly as smooth as possible. It has been found that, using this new system, better results are achieved if the CGBR is given a small weight. In addition, other series which previously took no part in the balancing, in particular the external and foreign currency counterparts, have been given weights, and some series which previously had taken part in the balancing were given none. The effect of the changes in weights is illustrated in Table B.

Table B
Average proportions in which the balancing adjustments are distributed

Percentages

	CGBR	Sterling lending to the private sector	External and foreign currency counter-parts	Net non-deposit liabilities of banks	Sterling M_3
Proportions used in 1981 and 1982 updates	—	45	—	—	55
Proportions used in 1983 update	20	35	15	20	10

Percentage growth in sterling M_3 since mid-February 1982



Petroleum Revenue Tax

Petroleum Revenue Tax (PRT) has been payable on 1 March and 1 September. After a transitional regime in 1983/84, PRT will be largely paid in monthly instalments in order to even out the flow of revenue. The seasonal adjustments to be applied to the CGBR, bank deposits and certificates of tax deposit from April 1983 onwards will therefore be very much smaller than in recent years.

A further revision, affecting the period October 1982 to March 1983 only, takes account of information indicating that a sizable proportion of PRT paid in March 1983 was financed from external transactions and by borrowing in sterling from UK banks.

Effects of the revisions

All the major seasonally adjusted series are smoother than before the revision. The pattern of growth in sterling M_3, PSL_2 and M_1 in the course of the last target period is little changed, as the chart for sterling M_3 illustrates.

(1) As displayed, for example, in the column headings in Tables 11.2 and 11.3 of the statistical annex.