Fifth, I fully agree that over-the-year comparisons are exceedingly poor substitutes for seasonally adjusted data.

Sixth, while the use of dummy variables for calendar changes such as Easter may be valuable, the use of degree-days or similar adjustments goes beyond seasonal adjustment to a more causative explanatory model.

Seventh, an additional test of any proposed method of seasonal adjustment is the relative accuracy with which the method reproduces the components of an artificially constructed series.

Finally, a practitioner of any new method must evaluate the impact of extreme observations and decide how to deal with them. In estimation by ordinary least squares the effect of extremes is proportional to the square of their deviation, while in the X-11 program their effect is reduced by identification and weighting.

Discussion

CHRISTOPHER SIMS and several other participants supported Lovell's suggestion that standard errors reflecting both seasonal adjustment and sampling uncertainties be published along with the unemployment statistics. Sims further pointed out that the calculation of standard errors on the seasonal adjustment would require an explicit stochastic model of how the series were generated. Lacking agreement on such a model, the adjusted series and standard errors calculated from a number of alternative models of the process should be made available to users of the statistics.

Sims also noted that an explicit model was needed to decide among different procedures for seasonal adjustment and that the fact that a procedure possessed some intuitively appealing properties was not a reliable basis for choosing it. The method that provided the smoothest series, for example, would take out too much variation by other criteria. In looking for residual seasonality by one method after first adjusting the series by another, one would be likely to find some even if the original adjustment were the appropriate one. Robert Solow added that the causal model underlying most present techniques of seasonal adjustment was implausible. These models

treated the adjustment problem as if the time of year were the causal factor to be corrected for, rather than factors such as how cold the weather was.

John Brittain noted that the choice of an adjustment that is "additive with trend" as opposed to multiplicative would be motivated by a causal model, not of the factors behind a particular month's seasonality, but of the relation of adjustment factors to cyclical changes in the economy. In his preferred model, when the labor force doubles, so will the seasonal component; but that is very different from the current BLS model for adults, which calls for doubling the seasonal component when unemployment doubles for cyclical reasons (subject to the reestimation of the seasonal component with each additional year's observation).

Brittain went on to explain how the BLS tests referred to by Early did not allow properly for additivity-with-trend and so led to misleading conclusions about the appropriate adjustment. For various subgroups and for each month separately, BLS regressed an estimate of the "seasonal-irregular" (SI) on the estimated "trend-cycle" (TC). The TC was essentially a centered twelve-month moving average (MA) of observed data. The SI was the difference between the observed value and this moving average. Both SI and MA should be expected to grow with the trend in the economy, thus exhibiting a common trend. In the BLS test, a significant intercept was taken as evidence of additivity, and a significant slope as evidence of multiplicativity. But because SI and MA have a common trend, a significant slope should have been expected in the BLS test even if an additive adjustment were appropriate in a given year; such a slope is therefore not evidence in support of a multiplicative correction.

Sims and William Poole both suggested separating the adjustments of current data and of historical series. Since the future is unknown when current data are adjusted, less of the relevant information for making an adjustment is available. This fact argues both for making a smaller adjustment of current data than of historical data and for presenting somewhat larger error bands around current estimates. Poole noted that, to the extent the process generating seasonality is changing, the adjusted data will be less smooth when originally released than they will be after historical revision. In response to Early's point that revisions are smaller on the average with BLS adjustment than with his own least-squares procedure, Lovell argued that any advantage of the BLS adjustment on this score was more than lost from the aggregation ambiguities introduced because it does not preserve sums. According to Lovell, further refinement in the least-squares technique

along the lines suggested in his paper will reduce the size of revisions from this technique.

Poole also voiced concern that an adjustment procedure that responded to the huge rise in unemployment in the first half of 1975 would overadjust unemployment in the first half of 1976 and correspondingly underadjust it in the second half. John Early noted that the change in the seasonal had not been large, amounting to only 0.1 or 0.2 percentage point in a monthly unemployment rate. Furthermore, part of the change in the seasonal factors came from adopting an additive adjustment to the teenage unemployment rate and not merely from the large rise in unemployment last year. Poole noted, however, that a monthly unemployment rate that is reported 0.2 percentage point too low in the spring and 0.2 too high in the fall generates a swing of 0.4 from spring to fall. A swing of this size might very well distort views of how the recovery is proceeding in 1976. Franco Modigliani noted that the mere size of the changes in the official statistics in recent months suggested that the adjustment was too great. Referring to table 6 in the Brittain paper, he noted that the official rate declined a full percentage point from October 1975 to February 1976, while the alternative adjustments, based on the additive and residual methods, each declined only one-half of a percentage point in that interval. Julius Shiskin replied that he and others at BLS also had been concerned about the size of the reported declines in particular months, but were convinced that they flowed from the best procedure that their analysis had produced. He urged that not too much attention be paid to the precise level of unemployment announced for any particular month since any such statistic was subject to the inherent uncertainty that earlier commentators had mentioned.

In contrast to the call for refinements voiced by many panelists, Lawrence Klein argued that, with the wide range of available potential seasonal-adjustment procedures, and the limited basis for choosing among them on traditional statistical grounds, stability and simplicity should be the criteria for seasonal-adjustment procedures. Users could easily understand a simple method, such as the ratio to a fixed trend, and could correct for such an adjustment or apply a further adjustment of their own. Because it would not change from month to month, users would at least know what they were looking at, an advantage that they are denied with the continual alterations in present seasonal adjustments.