

ERROR AND UNRELIABILITY IN SEASONALS

By

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An article in the *Annals of Mathematical Statistics* for February, 1930, entitled "A Mathematical Theory of Seasonals," by the Statistical Department of the Detroit Edison Company, has three objects. It presents a mathematical version of the time series analysis, suggests the "interpolation" method of computing seasonals, and constructs a theoretical time series as a test of the new method. The mathematical analysis and the theoretical series are based upon the assumption that the trend, cycle, and seasonal are proportional to each other, while the "errors" or residuals are additive in nature. The reasoning is not necessarily valid for series where the cycle or the seasonal is additive rather than proportional to the trend.

The interpolation method as proposed consists in (1) finding the total of the items for each of the twelve months, and (2) dividing each total by a function which theoretically contains the trend and the cycle insofar as they influence the particular month. In practice this twelve-month function turns out to be a smooth trend curve, and the method of its calculation inspires little confidence that it can reflect much cyclical influence. The function for each month is simply a weighted sum of the annual totals, the weights varying for different months. The early years are weighted more heavily in finding the values of the function which apply to the first half of the year, while the later years are given a greater weight in the second half of the year. The function is influenced almost solely by trend, or rather, by the difference between the first year and the last year of the data, since these two years are the only ones whose weights vary considerably from month to month. It is certain that no cyclical movement, however violent, can have the proper effect upon this function unless it affects the two extreme years.