MODIFICATIONS OF THE LINK RELATIVE AND INTERPOLATION METHODS OF DETERMINING SEASONAL VARIATION

By

RICHARD A. ROBB

In a recent paper[1] the statistical department of the Detroit Edison Company have introduced a new method of calculating seasonal variation in a time series. Briefly, the time series $_0u_x$ is represented by the function $_0u_x = f(x)\ c(x)\ s(x) + \varepsilon_x$ where $f(x)$ represents secular trend, $c(x)$ cycle, $s(x)$ seasonal, and ε_x residual errors, and by the Method of Least Squares the seasonal variation for any one month will be given by

$$(A) \qquad s_i = \frac{\Sigma\, {}_0u_x\, f(x) \cdot c(x)}{\Sigma\left[f(x)\, c(x)\right]^2} \qquad i = 1, 2, 3, \ldots 12.$$

where $s(i)$ represents the seasonal variation in the i th month and the summations in the right hand member of the equation are taken over the years covered by the time series.

If the Method of Moments be used

$$(B) \qquad s_i = \frac{\Sigma\, {}_0u_x}{\Sigma\left[f(x)\ c(x)\right]}$$

The trouble lies in the determination of the denominator $\Sigma\left[f(x)\ c(x)\right]^2$ or $\Sigma\left[f(x) \cdot c(x)\right]$. The Detroit Edison have overcome this difficulty by smoothing the observed time series with a sixth degree parabola, keeping the total population for each year unchanged over a period of seven years. In this way seasonal

1. A Mathematical Theory of Seasonals, *Annals of Math. Stat.*, I, p. 57.