Confluence Analysis
Sammenligning mellem
R. F. og andre metoder

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Amherst, Mass.,
April 19, 1937.

Professor Ragnar Frisch,
University of Oslo, Norway.

Dear Professor Frisch:

Thank you for your letter of March 28 from which it appears that we have understood each other.

I should be glad to have a copy of your "Confluence Analysis" if it is convenient to send me one. (A copy has been ordered for the College Library but it has not arrived yet).

Your regression has been very useful to me, lately, in three-variable problems to determine long-period relations. I find it much steadier than Least Squares (as one might expect) in the face of disturbing conditions in some one year.

Thus, in a relation for Illinois in the period 1879 - 1933

$$x_1 = \alpha\, x_2 + \beta x_3 \qquad (1)$$

we have by Least Squares: $\alpha + \beta = 1.2$; $\frac{\alpha}{\beta} = .8$ and by Frisch's Regression: $\alpha + \beta = 2.7$; $\frac{\alpha}{\beta} = .3$ (for the United States 1879 - 1933 by Least Squares: $\alpha + \beta = 3.1$; $\frac{\alpha}{\beta} = .3$, Frisch: $\alpha + \beta = 3.6$; $\alpha/\beta = .28$.) But, throwing out 1879 and considering the period 1889 - 1933, we have

Illinois
- Least Squares: $\alpha + \beta = 3.0$; $\frac{\alpha}{\beta} = .16$
- Frisch: $\alpha + \beta = 3.5$; $\frac{\alpha}{\beta} = .16$

Throwing out both 1879 and 1889 we have for the period 1899 - 1933

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(1) x_1 = log Employment per Capita; x_2 = log Value added per Capita, in constant dollars; x_3 = log of the ratio Total Wages/ Value Added.

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$$\text{Illinois} \begin{cases} \text{Least Squares: } \alpha+\beta = 2.6 \ ; \ \frac{\alpha}{\beta} = .17 \\ \text{Frisch} \quad\quad : \alpha+\beta = 3.1 \ ; \ \frac{\alpha}{\beta} = .19 \end{cases}$$

and similarly for 1919 - 1933 (data biennially)

$$\text{Illinois} \begin{cases} \text{Least Squares: } \alpha+\beta = 2.5 \ ; \ \frac{\alpha}{\beta} = .33 \\ \text{Frisch} \quad\quad : \alpha+\beta = 3.0 \ ; \ \frac{\alpha}{\beta} = .35 \end{cases}$$

Thus by introducing the data for 1879 the Long-Period Relation is quite distorted in the Least Squares Regression but not so in your Regression. This is accounted for by the fact that the Partial Correlation Coefficient $r_{13.2}$ drops from a value .87 to .30, if the 1879 data are used.

I suppose that the relation is generally known: "Frisch Regression coefficient times (corresponding) partial correlation coefficient is numerically equal to (corresponding) Least Squares Regression coefficient". In case this partial correlation coefficient is small, it means to me that the Least Squares Regression will bear watching.

With kind regards,

Yours,

Charles W. Cobb