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Correspondence

"A BRIEF NOTE ON SEASONAL VARIATION"

Editor, THE JOURNAL OF ACCOUNTANCY:

DEAR SIR: I was delighted to see the article by Arne Fisher (though I can't pretend to have digested it yet). Get writers like him and you have something!

Yours truly,

LEWIS A. CARMAN

Los Angeles, Calif.

Editor, THE JOURNAL OF ACCOUNTANCY:

DEAR SIR: I should like to offer some comment on "A brief note on seasonal variation," by Arne Fisher, which was published in your September issue.

In presenting an elegant and practicable method of determining the "evolutionary trend," Mr. Fisher has unnecessarily obscured the simplicity of his treatment and the significance of his results by suggesting that the justification of the method must be sought in the forbidding realm of higher mathematics. This is a bad beginning. "Certified by Pure Mathematics" is a tag that scares away the prospective user of an article, or else gives him a blind acceptance of it reminiscent of the attitude of the user of nostrums.

Mathematics is capable of guiding thought safely through jungles of irrelevancy, but no point reached will be better oriented than the point of departure. The refinement of the mathematical methods one employs must be compatible with the soundness of the hypotheses from which one starts—this is the essence of applied mathematics. If Mr. Fisher's algorithm has a meaning, this meaning is no more precise than the propositions we can state about the elementary composition of a time series; if what we can say a priori about a time series is very simple, then the basis for the algorithm must be very simple, though the development of the algorithm itself (which Mr. Fisher gives in the appendix) may seem complicated.

The following set of propositions make a plausible starting point for the analysis of a time series:

(1) During a given interval of time there is a trend that characterizes the evolutionary development of a business.

(2) The business output that might be reasonably expected at any point within this interval is periodically (seasonally) proportional to this trend.

(3) Superposed on the "normally expected" output during this time, there are minor random variations.

As far as I can see, there is nothing more that can be said a priori about a business chart in general, though in particular cases our knowledge may be much more definite. In symbolic form these three statements combine into a single equation:

$$Q(x)T(x) + F(x) = O(x)$$

where x is any date within the period of record corresponding to which:

$O(x)$ is the observed value of the series,

$T(x)$ is the value of the evolutionary trend,

$F(x)$ is the value of the random variation, and

$Q(x)$ is the value of the seasonal factor, which is characterized by having this same value one year (t) later; that is, $Q(x+t) = Q(x)$.

Though the observed series has thus been formally analyzed, we do not know the form of the three components on the left of the equation, and no amount of mathematics will determine it for us. Before we can proceed with the mathematical determination of $T(x)$ we need a new hypothesis, and this is necessarily weaker than the other three. What variations in the business chart we shall call fortuitous and what variations we shall consider as belonging in the evolutionary development is clearly a matter of their classification according to duration, for these variations are not of essentially different natures. A strike, for instance, may produce every type of movement in the business chart, from the slight flutter of the strike that does not materialize to the major movement of the long-drawn-out struggle with subsequent readjustments. In this sense, all movements are fortuitous. This necessary fourth hypothesis will be more in the nature of personal judgment; it will arise from our estimate of the sensitivity of business, of the "fine-grainedness" of the economic complex.

The existence of the seasonal factors in the form in which they are assumed implies the existence of a lower limit of "coarseness" in the dynamics of business. What is the smallest duration of a business surge or slump to which we can apply the seasonal factor? Surely, it seems absurd to suppose that business is periodically proportional to every little pulse that appears on the business chart; equally absurd would it be to suppose that the amplitudes of the seasonal periodicities respond to a long-time "straight-line" trend—even business reflexes cannot be that sluggish. The fourth hypothesis, then, is our explicit statement of the minimum duration of a feature in the evolutionary trend.

At this point the non-mathematical reader must take it on faith that mathematics offers a great many ways, all compatible with the four propositions stated, of developing $T(x)$. These are all methods of curve

fitting, no more, no less, and none can give $T(x)$ a meaning not implied in what has been said explicitly about it. What method we adopt will depend largely on expediency. Of the methods of curve-fitting that have come to my attention, there is none, for this particular purpose, so simple and so elegant, as the one presented by Mr. Fisher. It automatically eliminates the fortuitous variations and the seasonal factors and leaves a good picture of the evolutionary development of the business. In this method our fourth hypothesis appears in the selection of the number of Gram polynomials (the G 's of Mr. Fisher's paper) used in the development of the trend; the greater the number of G 's used, the finer-grained will the computed trend be.

Mr. Fisher's use of five G 's seems reasonable. By using this particular number, only those surges or slumps which persist longer than about six months are retained in the trend as significant.

If the opinion of an investigator of variations within the field of engineering is of interest to the investigator of business variations, I may state that Mr. Fisher's method yields as thorough an analysis of a purely-historical short record as it is possible to make.

Yours truly,

J. J. SLADE, JR.

New Brunswick, N. J.

EXAMINATION QUESTIONS

Editor, THE JOURNAL OF ACCOUNTANCY:

DEAR SIR: I have read with interest the letters addressed to you by Messrs. Kingsley and Peloubet—the latter, chairman of the board of examiners of the American Institute of Accountants—with regard to the certified-public-accountant examinations.

I disagree with Mr. Kingsley's point of view that these problems are never encountered in actual accounting practice.

On the contrary, it is my opinion that these problems are perfectly suitable for use in examinations for the certified-public-accountant degree. My only objection is that they are extremely lengthy and, as I see it, they cannot be worked out in the time given.

I believe that something could be done by the board of examiners of the American Institute of Accountants, so that this condition may be corrected in the future.

Yours truly,

FERNANDO J. DOMENECH

Rio Piedras, Puerto Rico

NOTE.—All questions prepared by the board of examiners of the American Institute of Accountants are solved by persons unfamiliar with them so that the adequate time may be allowed and the proper weight assigned before their inclusion in the official examinations.—EDITOR.