? February 1929

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Dear Mr. Wyld:

Any sequence of values, e.g. readings of a barograph at equal intervals of time, may show complicated body of fluctuations. In analysing these the primary distinction is between slow changes (the long period components of harmonic analysis) and rapid changes (the short period components).

This distinction is a graded one, and according to the circumstances our interest may be centred on the slowest, the less slow, the ~~factor~~ faster; or the most rapid changes observable. A limited series of observations will, however, give little information about movements of periods longer than the range of observation, that is changes so slow that they can have little effect during the period observed; and no information about changes with period less than twice the interval between two successive observations.

Within this range of slowness, however, it is still possible to obtai information about components of different slowness;

this information will be most abundant at the quickest end of the spectrum and least abundant at the slowest end.

The method of polynomial fitting (i.e. parabolae of successive degrees) breaks up the actual deviations into a finite series of components, from the slowest (the straight line) up to the most rapid given by the component of degree (n - 1) where n is the number of observations.

The agreement of two series may then be studied for any one or for any succession of several, of these components.

A frequent application is to throw out the first few components, representing the "trend", and to correlate the remainder, representing deviations from the trend. This is satisfactory provided this remainder is homogeneous, and is in fact composed of random fluctuations of the quickest kind.

In your case you have a close correspondence of the slowest changes represented by the cubic parabola, but this has only three degrees of freedom. You are not concerned with the quickest fluctuations, for the Gold Reserve has very small components in these, but you suspect that an intermediate group, represented by the lumps, confirms the correspondence of the slowest terms.

Direct confirmation should be obtainable from the next few