APPENDIX 3

The Section Moving Average

The section moving average, like the simple moving average described in Appendix II, is a mathematical device for removing irregularities in time series.

Unlike the moving average, however, it does not average consecutive terms or figures of a series. What it does do is to average two or more consecutive sections or cycles.

For example, imagine a series of figures representing the monthly sales for ten years of some business with a seasonal pattern (such as the ice-cream business). In the case selected, the cycle, being seasonal, is twelve months in length. The behavior for each year is influenced by its seasonal pattern, plus accidental distortions, cycles of other than 12 months in length, and trend.

Suppose we wish to calculate a three 12-month section moving average of these figures. We take the first, second, and third January and average them; the first, second, and third Februaries and average them; and so on, month by month, until we have averaged all the months of the first three years. This average of the three 12-month sections is the first section of the three 12-month section moving average. It is plotted in the second year.

Next we average the second, third, and fourth Februaries, and so on, until we have averaged the values for all months in the second, third, and fourth years.

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This gives us our second section of the three 12-month section moving average. We plot these values in the middle of the span being aver- aged, namely, the third year.

We proceed in this way until each possible consecutive group of three years has been averaged.

The effect of such a series of calculations is to minimize any of the month-to-month irregularities in much the same way that average would minimize them. That is, from the standpoint of accidental variations from the true cycle, it is unimportant whether or not we smooth the curve by averaging three consecutive numbers or by averaging three numbers twelve figures apart. In either case, minus distortions will tend to offset plus distortions, and accidental variations of one sort or another will tend to be spread over three months rather than be concentrated in the month in which they occur.

This technique is frequently used to reveal and determine a seasonal variation that changes over a course of time. Suppose, for example ample, that the seasonal variations have decreased percentage-wise with the increased size of the business. Then any average seasonal variation determined for the entire life of the business will fail to express the variation that took place in the earlier years, and will exceed the variation now present in the business figures. A section moving average will enable one to compute it on a varying instead of a fixed basis.

This technique serves also as a powerful tool in connection with cycle analysis.

First it is useful as a smoothing technique. Second, it is useful because - even if the length chosen for the section moving average is different from the length of the cycle - this fact has no influence upon the length of the cycle disclosed in the resultant. Thus, in the example chosen above, if we had chopped all series of figures into sections thirteen months long, averaging the first January with the second February and the third March, and so on, the cycle disclosed by this three 13-month section moving average would still show a 12-month period.

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Likewise, if we had chopped the curves into 11-month sections, the resultant pattern would not have been eleven months in length, but would have been twelve months as it was in the original series. There would, however, in these instances have been a certain dampening of the amplitude of the cycle.

We may generalize by saying that the length of the section moving average has no effect upon the length of any real cycle present in the original data, but that, as the length of the section moving average departs from the true length of the cycle, the amplitude of the cycle in the resultant average becomes less, until eventually it disappears entirely.

The third useful characteristic of the section moving average is the act that when a series is simultaneously influenced by two rhythmic factors and is long enough, a section moving average will completely eliminate either rhythm undisturbed.

For example, suppose a series simultaneously influenced by two regular cycle forces one of eleven months in length and the other of twelve months. By taking an 11-month section moving average of enough terms, the 12-month wave will vanish, leaving the 11-month wave undisturbed. Similarly, a 12-month section moving average of enough terms will eliminate the 11 month wave.

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