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Prospective Improvements

The monthly report prepared at the Bureau of the Census gradually evolved over a period of more than three years. It started with a few indicators and diffusion indexes and some cyclical comparisons. The amplitude-adjusted general indexes, adjusted rates of change, direction-of-change tables, and timing distributions were added later, one by one. The number of series and diffusion indexes were expanded periodically. On the other hand, several promising statistical measures were discontinued after some months on the proving ground, for example, frequency distributions of rates of change. On several occasions some material was eliminated from the report because it had become too bulky. The organization of the report was revised many times.

The process of exploring, testing, and revising was carried on simultaneously with new business cycle research. Both Moore's technique for judging the ultimate severity of recessions and his new list of indicators were in fact used in this report in their developmental stages, and were partly tested in this way before being made public. The same was true of some of the newly constructed series, such as the advance estimates of new orders, the index of investment orders and contracts, and the price/unit-labor cost index.

In view of the many innovations and the frequent changes made in the report, it seems only reasonable to believe that further innovations and changes would be desirable. Indeed, such a report should be kept flexible in order to benefit from these contributions. To emphasize this, as well as to indicate the limitations of our knowledge, it may be worthwhile suggesting directions the improvements which appear most promising might take.

A Business Cycle Chronology of Important Events

Good forecasts cannot be made on the basis of statistical measures alone. Knowledge is also required of exogenous economic events under way

or in the making. An illustration is provided by the situation in 1951 when most of the leading business indicators pointed to a reversal of the upward trend of the economy. Knowledge of the steps taken at that time by the government to build up our defense facilities in connection with the Korean War had to be taken into account in forecasting future trends. Another example is provided by the situation in the spring of 1960. Signs had multiplied that a reversal of the expansion was ahead or even under way. Once again it was necessary in considering this prospect to take into account, insofar as possible in quantitative terms, the measures taken by the government to bolster the economy by accelerating defense and highway expenditures and moving toward easier money.

In connection with these studies, a detailed record of the standing of our principal indicators during the months before and after business cycle turning points has been built up.[1] A record of important political, international, and economic events should be arranged in a similar way and brought up to date each month. Then the business cycle analyst would be able to make a better judgment of the effect of economic and political actions upon the indicators in the past and take such knowledge into account in judging current developments. The intermingling of events in the public and international sectors of the economy with the cumulative business cycle developments in the private sector is hard to disentangle and evaluate, but this is an essential part of the task of business forecasters.

Research on Current Business Cycle Measures

Investigation of several types of business cycle measures may be helpful in improving this reporting system. First, it would be desirable to consider separately the performance of the indicators at peaks and at troughs. In recent years, the emphasis has been on indicators that behave similarly at both upper and lower turning points. It is well known, however, that series with strong growth trends tend to lead at troughs but lag at peaks. Unfilled orders usually show much longer leads at peaks than at troughs, and the same may be true of certain other leading indicators, such as inventory investment. Personal income has become coincident at troughs, but still lags at peaks. Such differences should be carefully studied and their persistence and economic interpretation considered. The common list might then be supplemented at each turn by a few series that are good indicators at that turn but not at the other.

[1] For the records for the twenty-six NBER indicators, see *Business Cycle Indicators*, Volume I, Appendix C.

A comprehensive study should be made to determine whether the use of specific benchmark dates can provide an earlier reliable indication of the ultimate severity of a current recession than reference benchmark dates.[2] Their value as a check on the results based on reference benchmark dates should also be determined. Other possibilities, suggested by Moore, are to identify "recovery dates," that is, dates at which expansion reached the levels of the preceding peak, or "diffusion dates," that is, dates when the expansion was most widespread, and to use these dates as benchmarks in comparing changes during the later stages of expansion. The diffusion dates could be used during contractions also.

A third line of investigation is the timing distribution of current highs (and lows), which are a way of appraising the strength and likely duration of the current movement. The percentage of series currently high is useful, but many revisions in the historical series are required each month, and it measures only one point in the distribution. An attempt to develop a summary measure of the whole distribution of highs, which portrays the relative strength during recent months, is desirable. Wright's experiments in this respect might bear further study.

A fourth line of investigation that seems worth pursuing is to study the cyclical properties of adjusted rates of change, which are often easier to prepare than diffusion indexes since they do not require data for component series. They can, therefore, more readily be extended to earlier periods, to new bodies of economic data, and to data covering shorter time intervals (e.g., weeks) than diffusion indexes. The comparisons made thus far show that diffusion indexes are a little smoother and have somewhat clearer cyclical amplitudes than corresponding adjusted rates of change. Furthermore, a diffusion index answers a different question about what is taking place in the economy than the rate of change in an economic aggregate. The practical merits of adjusted rates of change, however, are so great that further testing is warranted.

Need for Improved Data

Further improvements in the statistical program, especially for short-term forecasting, are essential. An important step forward would be to increase the frequency and promptness of the indicator series. The eleven quarterly series included in the list of our principal business

[2] An experiment, which I recently completed, shows that substantially better results are obtained by marking off changes in the rankings of the general index for the leading series against the standard NBER business cycle reference peaks (Moore's usual practice and the one followed above), which are based on coincident series, than against special reference dates determined from leading series alone.

cycle indicators should eventually be replaced by corresponding monthly series or supplemented by close monthly approximations. Weekly figures for a few strategic indicators would be particularly useful in the neighborhood of business cycle turning points. Weekly seasonally adjusted figures make it possible to anticipate the corresponding monthly totals and to make some judgments of trends within the month. They can be useful even when week-to-week movements are not in themselves significant. Thus, where seasonally adjusted weekly figures are available, four comparisons can be made each month: the first week of the given month with the first week of the preceding month; the second week of the given month with the second week of the preceding month; and so on. Weekly figures can thus provide more current information than monthly figures, as well as make more frequent current comparisons possible. A four-week moving average of weekly figures provides more information than a set of monthly totals and, obviously, more than a monthly series that covers one week of each month (as do most U.S. series on employment). Weekly series that would be most helpful, besides those already available, include manufacturers' new orders and sales, average hours of work in manufacturing, man-hours in manufacturing and in all nonagricultural industries, and total retail sales.

Studies carried out at the Bureau of the Census indicate that ten-day series (series reported for three approximately equal periods each month and expressed as daily averages) can be more effectively used than weekly series, because they reduce the unequal number of periods in the different months. Such series appear to lend themselves to better holiday and model year adjustments and can be smoothed more efficiently (that is, there is a greater amount of smoothness for a given loss in currency) than monthly series. Such series could, therefore, be used to compile more useful monthly series and, in addition, would be available more frequently than the corresponding monthly series.

The release dates of many of the monthly and quarterly series also need to be accelerated. At present, less than two-thirds of the monthly business indicators are available by the middle of the month following that to which the data refer, as can be seen in Table 19. One of the most significant quarterly series—corporate profits—is sometimes not available until the sixth month following the end of the quarter. For example, in May 1961 the latest figure available was for the third quarter of 1960. Another important illustration is provided by military expenditures, which make up about half of the national budget and about 8 per cent of the GNP. They are subject to some acceleration or retardation, as part of normal government housekeeping operations. For these reasons, series on Defense Department obligations—that is,

commitments to spend—represent an important forecasting tool. Such series are presently available, but they are not issued until several months after the one covered.

There are still weaknesses in statistical records. The important employment and unemployment series presently cover only a single week of each month, that including the twelfth. Such series are inherently less stable than series covering the full month. Problems of interpretation sometimes arise when holidays occur during the survey week (especially in measures of the number of hours worked per week), and when there are extreme variations in weather or other conditions during the month. In such circumstances, it is difficult to judge current trends and to make precise comparisons with series that cover the full month, such as industrial production and retail sales. The feasibility of covering the full month, through a weekly or ten-day survey, seems well worth exploring.

New business starts reflect the vitality of the economy. They foreshadow new employment and output because a business start may be preceded or followed by a flurry of economic activities—buying equipment and stock, borrowing money, advertising, hiring employees—and because business starts are especially sensitive to many of the factors that promote or inhibit expansion of existing enterprises. The present series on all business births, which includes nonincorporated as well as incorporated new businesses, has weaknesses. It is not based on a direct reporting program, but is rather a series of estimates based upon indirect sources. A monthly series on new business starts and discontinuances, built up from direct field reports and providing data on industry and size of business, is required to measure this vital aspect of a free enterprise economy.

Another neglected area is transportation. Freight carloadings used to be one of the most important and reliable weekly indicators of current business conditions, since it measured a substantial portion of the total flow of merchandise from sector to sector of the economy. In recent years, however, it has been losing significance because of the shift of freight from railroads to trucks and, to a lesser extent, aircraft. As a result, since World War II, this series has had a downward secular trend, in sharp contrast to comprehensive measures of the physical volume of economic activity. This phenomenon probably accounts for its pronounced postwar tendency to turn down before business cycle peaks. New series on truck loadings and perhaps air freight volume are needed to combine with freight carloadings into a new weekly series on total freight carried.

Another important need is a series on the volume of public highway construction. Information about this activity is desirable for two reasons.

TABLE 19

RELEASE DATES OF CURRENT FIGURES FOR SIXTY-FIVE BUSINESS CYCLE SERIES

Date	*Number of Series*		*Series Identification Numbers*	
	Among 51 Indicators	Among 14 Other Series	For 51 Indicators	For 14 Other Series
MONTHLY SERIES				
Same month				
21st to 25th	1		5	
Following month				
1st to 5th	2	1	19, 23	93
6th to 10th	6	1	15, 42, 43, 44, 54, 55	85
11th to 15th	17		1, 4, 7, 14, 17, 26, 27, 29, 30, 32, 41, 45, 47, 51, 52, 53, 62	
16th to 20th	4		6, 24, 25, 46	
21st to 25th	1	3	13	82, 83, 84
26th to 31st	3	2	9, 10, 66	81, 94
Second following month				
1st to 5th	6	3	2, 3, 20, 31, 64, 65	86, 87, 88
6th to 10th	1		12	
15th to 20th		2		90, 91
Third following month				
1st to 5th		1		92
QUARTERLY SERIES				
Following quarter				
Second month	8	1	18, 21, 49, 50, 57, 61, 63, 67	89
Third month	2		11, 16	

NOTE: The above dates may vary slightly from month to month because of the different dates on which week-ends fall. In some instances, the dates refer to preliminary figures with final data becoming available somewhat later.

First, highway construction calls for large amounts of cement, steel, and other materials. Moreover, new highway construction may be one of the measures that the government utilizes to combat recession. Thus, in June and October 1960, and again in February 1961, the Secretary of Commerce accelerated the availability of federal funds allotted for public highway construction. A prompt monthly series on public highway construction is not yet part of the government statistical program.

Improvements in Statistical Techniques

Many of our statistical series should also be more accurate. A new statistical measure, *MCD* (months for cyclical dominance), identifies series with the greatest need of improvement from the point of view of business cycle analysis. Series with large *MCD's* should be improved, if practicable, where the source of erratic movements lies in smallness of coverage or other types of measurement error. For those series which still have *MCD's* greater than unity after improvement, short-term moving averages of periods equal to *MCD* should supplement the seasonally adjusted series.[3]

Great strides have been made in recent years in providing seasonally adjusted data through the use of electronic computers. Further research to improve techniques, particularly for handling the most recent months of series, is warranted. Improved electronic computer programs for making weekly seasonal adjustments and adjustments of monthly or weekly series expressed in both positive and negative values are also needed.

Revisions of data are troublesome to the student of current business conditions. However, revisions cannot be avoided because of the need, on the one hand, for an accurate base with which to compare current figures, and, on the other, for early figures to make prompt judgments on cyclical changes. At present, practices in making such revisions vary widely. Guiding principles in determining when revisions are worthwhile should be established. Furthermore, revisions should, as a rule, be introduced at a few specified times each year to spare the analyst, who combines many different series into various analytic measures, the task of revising his materials every month. Alternatively, of course, the analyst may elect to ignore revisions that do not meet his standard of importance.

Finally, it would be desirable to develop a set of objective criteria for judging and describing the movements in economic series each month, so that personal interests or lack of knowledge would not preju-

[3]See my "How Accurate?" *American Statistician*, October 1960, pp. 15-17, and *Business Cycle Indicators*, Volume I, Chapter 18.

dice the interpretation of economic fluctuations. Objective standards would reduce the prospects of making different interpretations of similiar situations, or overemphasizing temporary factors at the expense of underlying causes. These standards should include methods of describing nonseasonal as well as seasonal movements. The task is not an easy one, however, because of the large variety of conditions—economic, political, and international—which make up the environment in which the statistics are released each month.

It is apparent from this list of necessary improvements that there are important gaps in the coverage of statistical series for short-term business forecasting, and that the statistical techniques are still in developmental stages. Consistent early movers among economic time series have been identified, but the record shows that the performance of some of these leaders is different at peaks and at troughs, and that the period of the lead before either peaks or troughs varies from series to series and from cycle to cycle. Moreover, the theoretical foundations upon which this reporting system has been built are still incomplete. Therefore, despite the advance that is represented by the reporting system described here and the years of statistical and analytical work behind it, caution must still be the byword in interpreting the information it provides on current business cycle developments, and it should be used to supplement other types of economic analysis, not to replace them.