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CHAPTER 3

Leading and Confirming Indicators of General Business Changes

Geoffrey H. Moore

THIS is a progress report on a series of experiments being conducted at the National Bureau of Economic Research that we hope will enable us to learn more about the way our economy behaves. These experiments have had a fairly long history, and I should like to review it briefly.

Selection and Classification of Indicators

Before the war, in 1937, Wesley Mitchell and Arthur Burns picked a set of twenty-one indicators from among the several hundred time series that the National Bureau had analyzed in its study of business cycles.[1] After the war I undertook to redo the job and in 1950 published a new list of twenty-one indicators.[2] They are classified in three groups—leading, roughly coincident, and lagging—according to their tendency to reach cyclical turns ahead of, at about the same time as, or later than business cycle peaks and troughs.[3] Many of the series in my list were either identical with or closely related to those in Mitchell's and Burns' list, but I omitted some that seemed redundant or of dubious value, and added some on the basis of new information. But both their study and mine were based on prewar information about the cyclical behavior of the data. The experimental part of the project consists in seeing whether this prewar information provided a useful guide to the postwar behavior of these data in relation to business cycles.

We had some basis for confidence that the prewar information would provide a useful guide. The basis was the usual mixture of empirical finding and theoretical reasoning. From the extensive studies of Mitchell, Burns, and others it was plain that the alternating periods of expanding and contracting economic activity defined as business cycles were

NOTE: Based upon an address given at the Second Annual Midwest Conference on Business Indicators, April 23, 1955, sponsored by the Chicago Chapter, American Statistical Association, and the Business Statistics Committee, Chicago Association of Commerce and Industry. The text and charts have been extensively revised and brought to date.

[1] Their report, *Statistical Indicators of Cyclical Revivals*, is reprinted here, Chapter 6.

[2] This report, *Statistical Indicators of Cyclical Revivals and Recessions*, is reprinted here, Chapter 7. For a chart of the individual indicators (now brought up through 1958), see Chapter 7, Chart 7.6.

[3] For the business cycle chronology, see Appendix A.

characterized by a *system* of relations among different factors or aspects of economic activity. Some of these relations repeated themselves more frequently or more faithfully than others. Many of them could be explained or accounted for after a fashion, although the explanation of any one of them was ultimately tied up with the explanation of the whole system. But the system as a whole was extremely complex, both from a statistical and an economic point of view. The problem, as Mitchell saw it, called for an intricate scheme of statistical measurements covering long historical periods, and for careful economic analysis of the many sectors—production, consumption, income, finance, prices, inventories, and so on—that seemed to bear an important share of responsibility for the basic phenomenon, the business cycle.[4]

Our studies of indicators have cut through this broad research program in a particular way and at a particular stage of its development. In a sense, the selection of indicators was an attempt to get at and put to use some of the more systematic repetitive relationships discovered in the broad study. This accounts in part for the confidence with which we viewed the indicators that were finally selected and also for some of their limitations.

These limitations arise chiefly because it is impossible, in a set of twenty-one time series selected for the relatively systematic behavior of the economic processes they represent, to depict all the relationships that contribute importantly to an understanding of the actual cyclical movements of the economy. For one thing, it is clearly necessary to take into account the less systematic factors. For example, there are only two series in the list—bank debits and bank interest rates—that directly reflect the operations of the banking system. This is not because banks are not important. It is simply because, out of the twenty-five-odd series on Federal Reserve System and member banks that we examined, not one had behaved in a sufficiently systematic, repetitive manner during the interwar period to pass the rather rigid statistical criteria we set up for selecting indicators.

Another limitation is that, despite the considerable progress made in the broad study, we still did not have an adequate "explanation" for some of the systematic relationships that turned up. To take an interesting example, we had long observed—indeed, Mitchell made some observations on it in his book on *Business Cycles* in 1913—that the aggregate liabilities of business failures behave differently from the aggregate number of failures. The liabilities make wider swings, and they usually move earlier. Perhaps it is reasonable that deteriorating business conditions should tend to increase the average size of firm that fails. Mitchell

[4] For a list of the studies using this scheme that have been published to date, see the end of this volume.

thought that the financial strains associated with recession forced larger firms to the wall—firms that under prosperous conditions would seldom fail. But why should the average size begin to shrink during a business contraction while the number of failures is still increasing? And why, during a business expansion, should the average size of failure begin to rise while the number of failures continues to decline? We have some plausible hypotheses about this, but we do not have a tested explanation, even though the phenomenon has appeared again and again throughout our business cycle history.[5]

Most of the prewar relationships exhibited by the twenty-one indicators have survived a great many years and a wide variety of so-called "structural" changes in the economy. And in most cases we do know something about the reasons for these relationships. Personal income, for example, was classed as a lagging series, though the fact that it was at the top of the list of five laggers meant that its average lag in the prewar period was shorter than that of any of the other four, and hence not greatly different from those in the group called "roughly coincident." In fact, the lags in personal income appeared mostly at business peaks. The tendency to lag is accounted for by the behavior of the major components of aggregate personal income.[6] One of the most cyclically sensitive components—labor income in manufacturing, mining, and construction—has moved in virtually synchronous fashion with general business activity, despite the fact that wage rates per hour lag.[7] But all of the other major components—labor income in the service industries and in government, dividends, interest, and rental income—have tended to lag behind turns in business activity, and these lags are occasionally reflected in total income. The reasons for the lags seem to persist: the stability of white-collar employment, the inflexibility of salaries, the tendency for dividends to reflect *past* profits, and the contractual character of interest and rents.

Despite all this, it would be difficult to classify total personal income as a lagging series in the postwar period, although this tendency still appears to be stronger at peaks than at troughs. It led by two months at the November 1948 peak, lagged by three months and by one month

[5] See the essay on business failures by Zarnowitz and Lerner in Chapter 12.

[6] See Daniel Creamer, *Personal Income during Business Cycles*, New York, NBER, 1956, and *Behavior of Wage Rates during Business Cycles*, Occasional Paper 34, New York, NBER, 1950.

[7] During 1929–58 the labor income series reached cyclical turns at precisely the dates indicated by our business cycle chronology on no less than 7 out of 12 occasions. The exceptions were a lead of one month at the February 1945 and July 1957 peaks, a lead of two months at the November 1948 peak, a lag of four months at the October 1945 trough, and a lag of one month at the August 1929 peak (see Appendix B). Most of the business cycle turns were dated without reference to the labor income series *per se*, and in all cases a wide variety of other information on business activity was taken into account in choosing the dates.

at the July 1953 and July 1957 peaks, respectively. It was coincident at the October 1949 trough and led by five and by two months at the August 1954 and April 1958 troughs. The prompter upturns appear to be attributable in part to the increasing importance of transfer payments, such as unemployment compensation, which move countercyclically and hence help to offset declines in other types of income. In 1958, for example, the low point in total personal income came in February, but the low in income minus transfer payments did not come until April.

Two observations sum up these remarks on the nature of our study of indicators. First, whatever confidence the results deserve derives from the fact that the economic relationships reflected by the indicators have run the gauntlet of a changing environment and careful scrutiny in a broad scientific study of business cycles. Second, whatever limitations they may have arise because we do not know as much as we would like to about these interrelationships, but we do know that the information provided by these few series themselves is insufficient for a thoroughgoing analysis. In view of these facts, it will certainly become necessary and desirable—indeed it always has been—to revise and amplify this list of twenty-one series. A step in this direction, based on studies completed since 1950, is taken in a later section of this paper.

A Test of the Selection and Classification of Indicators

To get back to the experiment itself, what can we say about our results in the postwar period? As the illustration of personal income proves, the behavior of some of the individual series is a bit out of line with what might have been expected. Yet if we were to reclassify the twenty-one series into the three groups (leading, roughly coincident, and lagging) taking into account the postwar information, the only series that should be shifted would be personal income, retail sales, and corporate profits. The first two now appear to be better classified in the roughly coincident group, and the third in the leading group.[8] Freight carloadings, classed as roughly coincident in the prewar period, have shown long leads at peaks in the postwar period, reflecting the declining trend of rail traffic. Hence this series has become increasingly deficient as an indicator of total

[8] Leads in corporate profits have been far more frequent than lags, and somewhat more frequent than rough coincidences (leads or lags of three months or less). During 1921–58 there were 12 leads, 10 rough coincidences (of which 3 were exact coincidences), and 2 lags (see Appendix B). This record is based on a comparison of the quarterly turns in profits, dated at the midmonth of the quarter, with the monthly business cycle turns—our standard method of measuring leads and lags of quarterly series. If the profits turns were compared with the quarterly reference dates, there would be more coincidences, but no lags (9 leads, 10 rough coincidences—8 exact, and no lags). Tests have shown, however, the standard method is a better procedure, in that it is more likely to yield results similar to those that would obtain if the series were monthly instead of quarterly. (See *Measuring Business Cycles*, p. 228.)

business activity, although the upturns in carloadings have continued to match closely those in business activity. The other series have all behaved in a manner consistent, or at least not inconsistent, with their prewar record (for the full record, see Appendix B). It is true that some leads have been extremely long, like the twenty-month lead in the average workweek at the 1957 peak, and some "extra" cycles have occurred, like those in building contracts in 1950–51; but such things happened occasionally in the prewar period too.

A comparison of the timing of each of the twenty-one indicators at the three business cycle peaks and three troughs since 1948 with their average timing through 1938 is made in Chart 3.1.[9] The general conformity of the postwar to the prewar record is apparent, although at peaks the leads of most of the leading and some of the roughly coincident indicators have been substantially longer than the prewar average. The results are summarized in Table 3.1 and merit careful study.

We learn, for example, that at the three postwar business cycle peaks and three troughs the eight leading indicators (col. 5) led on thirty-four occasions (lines 6 and 7), coincided three times (line 8), and lagged once (lines 10 and 11). However, there were eight occasions when one or another of them reached a (specific cycle) peak in the absence of a business cycle peak with which it could be compared (line 4). Further, there were ten instances (out of forty-eight possibilities) when a business cycle peak occurred but no specific cycle peak that could be compared with it was reached (line 3). This information is brought together in the latter part of the table in the percentage distributions of the entries.

The first percentage distribution (lines 14 and 15) measures the extent to which timing observations consistent with the classification of the indicator have prevailed among all the timing observations. Thus, taking the postwar peaks and troughs together, we find that the eight leaders led in 93 per cent of the instances when a timing comparison could be made, and lagged in 7 per cent (exact coincidences are counted as half lead and half lag). The eight roughly coincident indicators roughly coincided (turned within three months of the business cycle turn) 71 per cent of the time and failed to do so 29 per cent. The five lagging indicators lagged 71 per cent of the time and led 29 per cent. Figures of this type demonstrate the dependability of the classification in differentiating leading, coinciding, and lagging indicators.

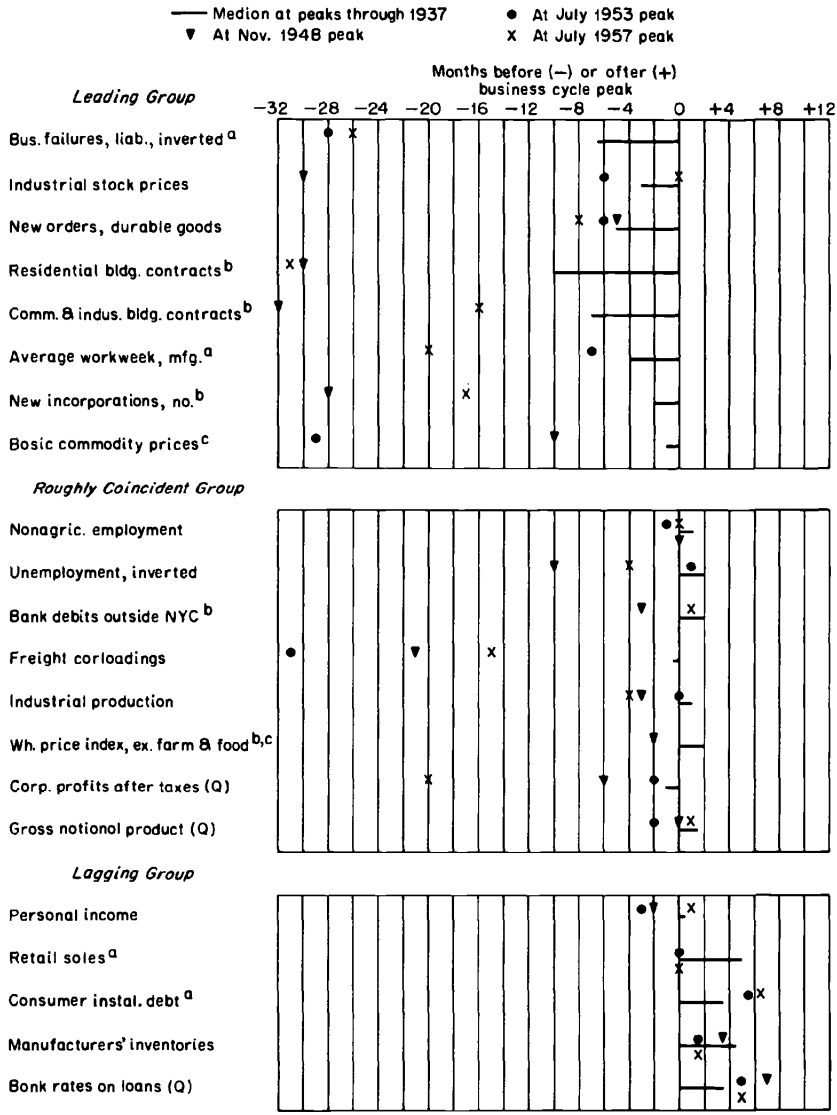
The second percentage distribution (lines 16–18) enables us to judge the excellence of, say, a leading indicator not only by its tendency to lead rather than lag, but also by its ability to reach a corresponding turn every time a business cycle turn occurs. Hence in line 16 the leads of the

[9] For a test that bears in a different way on the timing of the indicators—in a way not contemplated at the time they were selected, see Chapter 5.

CHART 3.1

Leads and Lags at Business Cycle Peaks and Troughs, Twenty-one Indicators

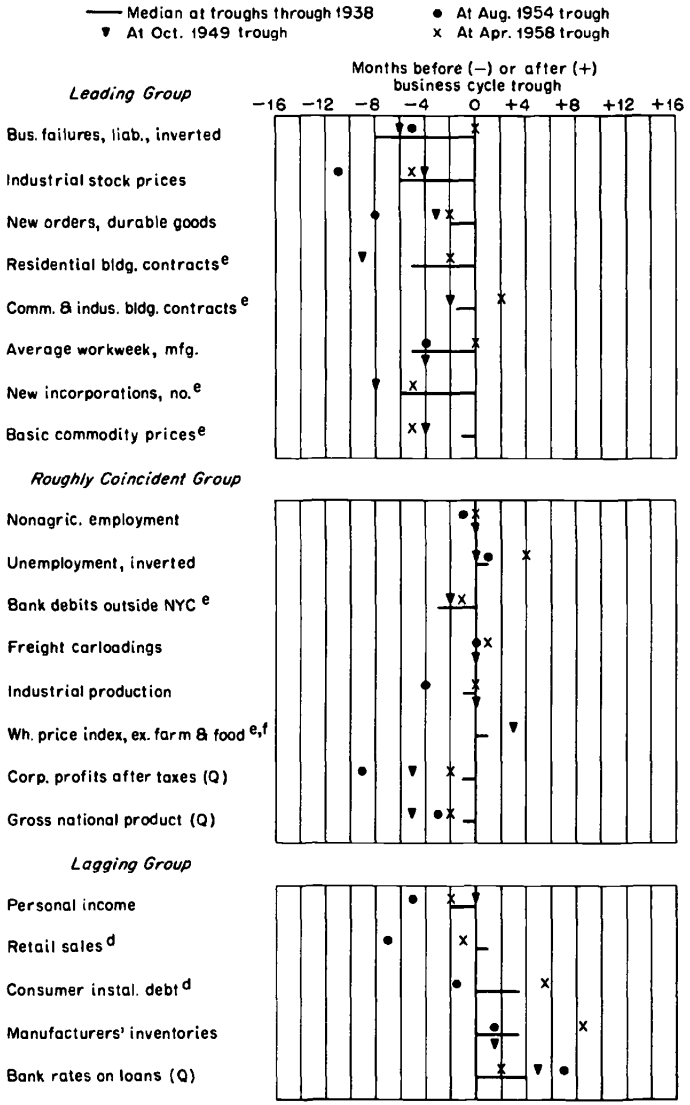
A. Peaks



[a] No cyclical peak corresponding to November 1948 peak.
[b] No cyclical peak corresponding to July 1953 peak.
[c] No cyclical peak corresponding to July 1957 peak.

CHART 3.1 (concluded)

B. Troughs



[d] No cyclical trough corresponding to October 1949 trough.
[e] No cyclical trough corresponding to August 1954 trough.
[f] No cyclical trough corresponding to April 1958 trough.

leaders are compared with the total number of business cycle turns covered by the series. In line 17 the lags of the leaders are taken as a percentage of the same total, and in line 18 the percentage of business cycle turns that are skipped is recorded. Similar entries are made for the other groups of indicators.

Finally, the third distribution (lines 19–21) takes account of the "extra" specific cycle turns—turns that occurred in the series in the absence of a corresponding business cycle turn. Of all the specific cycle turns observed, line 19 shows what percentage was consistent in timing with the classification of the indicator, line 20 what percentage was inconsistent in timing, and line 21 what percentage failed to match a business cycle turn at all.

In summary, we can say that out of the 120 specific cycle turns in the indicators, 70 per cent occurred where expected relative to business cycle turns. We can also say that out of the 126 opportunities to match

TABLE 3.1

Prewar and Postwar Timing of Twenty-one Indicators

	Prewar Business Cycle Peaks and Troughs (to 1938[a])				*Postwar Business Cycle Peaks and Troughs (1948–58)*			
	8 Leading Indicators (1)	8 Roughly Coincident Indicators (2)	5 Lagging Indicators (3)	21 Indicators (4)	8 Leading Indicators (5)	8 Roughly Coincident Indicators (6)	5 Lagging Indicators (7)	21 Indicators (8)
1. Total business cycle turns covered[b]	176	138	41	355	48	48	30	126
2. Total specific cycle turns covered[c]	176	122	38	336	46	46	28	120
3. Business cycle turns not matched	17	19	5	41	10	6	4	20
4. Specific cycle turns not matched	17	3	2	22	8	4	2	14
TIMING COMPARISONS								
5. Total timing comparisons:	159	119	36	314	38	42	26	106
6. Leads, 4 months & over	90	26	4	120	30	11	2	43
7. Leads, 1–3 months	34	24	4	62	4	12	4	20
8. Exact coincidences	10	29	4	43	3	12	3	18
9. Rough coincidences[d]	57	81	17	155	8	30	14	52
10. Lags, 1–3 months	13	28	9	50	1	6	7	14
11. Lags, 4 months & over	12	12	15	39		1	10	11
12. Consistent timing comparisons[e]	129	81	26	236	35.5	30	18.5	84
13. Inconsistent timing comparisons	30	38	10	78	2.5	12	7.5	22

TABLE 3.1 (concluded)

PERCENTAGE DISTRIBUTION OF TOTAL TIMING COMPARISONS								
14. Consistent timing	81	68	72	75	93	71	71	79
15. Inconsistent timing	19	32	28	25	7	29	29	21
PERCENTAGE DISTRIBUTION OF BUSINESS CYCLE TURNS								
16. Consistent timing	73	59	63	66	74	62	62	67
17. Inconsistent timing	17	28	24	22	5	25	25	17
18. Unmatched business cycle turns	10	14	12	12	21	12	13	16
PERCENTAGE DISTRIBUTION OF SPECIFIC CYCLE TURNS								
19. Consistent timing	73	66	68	70	77	65	66	70
20. Inconsistent timing	17	31	26	23	5	26	27	18
21. Unmatched specific cycle turns	10	2	5	7	17	9	7	12
AVERAGE LEAD (−) OR LAG (+) (IN MONTHS)								
22. Consistent timing comparisons	−7.2	+0.1	+6.1		−11.7	−0.5	+3.9	
23. Inconsistent timing comparisons	+4.7	−8.9[f] +7.3[g]	−3.4		+0.8	−11.9[f] +4.0[g]	−2.5	
24. All timing comparisons	−4.9	−1.1	+3.5	−2.5	−10.9	−3.4	+2.1	−4.7

NOTE: The business cycle peak of February 1945 and trough of October 1945 and specific cycle turns during 1939–45 are omitted. For data on peaks and troughs separately, see Table 3.5 in the appendix.

[a] Includes all specific and business cycle turns covered by each indicator or its historical equivalent through 1937 (peaks) or 1938 (troughs). See Appendix B.

[b] Sum of lines 3 and 5.

[c] Sum of lines 4 and 5.

[d] Includes leads of 1–3 months (line 7), exact coincidences (line 8), and lags of 1–3 months (line 10).

[e] For leading indicators, number of leads plus one-half the exact coincidences. For roughly coincident, number of rough coincidences. For lagging, number of lags plus one-half the exact coincidences.

[f] Leads longer than 3 months.

[g] Lags longer than 3 months.

business cycle turns, the indicators did turn according to their classification in 67 per cent of the cases. More of the "errors" were leads rather than lags; that is, of the twenty-two timing observations that were inconsistent with the classification of the indicators, 18.5, or 84 per cent, were leads.[10] The behavior of the leading series was somewhat more

[10] This may suggest that the business cycle turns were placed too late. However, although errors of a month or two in the reference dates are clearly possible, we do not believe there is an appreciable bias in one direction or the other in the postwar period, either absolutely or compared to the way these dates were selected in the prewar period. Although there is a certain degree of redundancy in that some of the indicators (especially the roughly coincident ones) play a large role in the selection of the reference dates themselves, the effect of this on the results should not be exaggerated. While this fact does imply that the turns in the roughly coincident indicators should center around the reference dates, there is nothing in the method that necessarily makes them roughly coincident. I.e. leads or lags longer than three months might predominate, even in this group. Moreover, the relative timing of the three groups of indicators with respect to one another is not affected by the choice of reference date.

consistent with their classification as leaders than that of the other two groups. Furthermore, the "errors" (lags in the case of leaders, leads in the case of laggers) were clearly smaller, in average magnitude as well as in number, than the "successes," as lines 22 and 23 of the table testify.

A "success" record of 67 per cent does *not* mean that in two out of three business cycle turns the indicators worked out as expected whereas in one out of three they did not. The record was fairly typical of each business cycle turn in the postwar period. The following figures demonstrate this point (see also Chart 3.1).[11]

Consistency of Timing of Twenty-one Indicators at Each Business Cycle Turn, 1948–58

	Number of			*Percentage Consistent of*	
Business Cycle Turn	Consistent Timing Comparisons	Inconsistent Timing Comparisons	Unmatched Business Cycle Turns	Actual Timing Comparisons	21 Possible Timing Comparisons
Peak, Nov. 1948	13	4	4	76	62
Trough, Oct. 1949	16.5	2.5	2	87	79
Peak, July 1953	14.5	1.5	5	91	69
Trough, Aug. 1954	11	4	6	73	52
Peak, July 1957	14	5	2	74	67
Trough, Apr. 1958	15	5	1	75	71
Total or average	84	22	20	79	67

These results underline the advantage, if not the necessity, of depending on groups of indicators rather than on any single one (of average fallibility). If a substantial majority of a group of indicators behave as expected at every business cycle turn, there is a good chance that the analyst can form a correct judgment of affairs at every turn. Further analysis of the behavior of the indicators as groups is undertaken in a later section of this paper (see pp. 69ff.).

Perhaps the most instructive aspect of Table 3.1 is the comparison of the postwar with the prewar record. Since the indicators were selected on the basis of prewar records, it comes as no surprise that in the prewar period the three groups of indicators behaved according to their classification. What is significant, and encouraging, is the fact that the postwar record is substantially the same as the prewar record. The prewar experience provides a standard to compare how frequently the timing of cyclical turns in an indicator is consistent with its classification, as well as how

[11] This record does not include the 14 "extra" specific cycle turns, since these by definition could not be matched with any single business cycle turn. In fact, however, all of them occurred during the Korean War, 1950–52.

frequently a series skips business cycle turns or reaches extra cyclical turns. The postwar record stands up well against this rigorous yardstick, although business cycle turns were skipped and extra cyclical turns were reached somewhat more frequently in the postwar than in the prewar period. On the whole, the indicators did as well in the postwar period as could have been expected in the light of their prewar record.

A New List of Indicators

The three business cycles of the postwar period, 1946–58, provide a substantial addition to our records of cyclical behavior. As noted above, these records suggest that certain of the indicators should be reclassified. Moreover, since several of the recent studies reported in this book provide new information on specific indicators, it seems worth-while to take account of all these results and produce a new list of indicators (Table 3.2 and Chart 3.2).

The new list, selected on the basis of the same criteria used in drawing up the 1950 list, includes twenty-six indicators, of which twelve are classified as leading, nine as roughly coincident, and five as lagging. Fifteen of the twenty-six are on the 1950 list. Five more are substitutes for closely related series on the 1950 list. A series on housing starts has been substituted for residential building contracts, net change in the number of operating businesses for new incorporations, Standard and Poor's comprehensive common stock price index for Dow-Jones' industrials, industrial materials spot market price index for the more comprehensive basic commodities price index, and a series on the rate of unemployment for total unemployment. One indicator on the 1950 list has been dropped: freight carloadings. Six series have been added: gross accession or hiring rate, layoff rate, and change in business inventories to the leading group; GNP in constant prices to the roughly coincident group; and plant and equipment expenditures and wage and salary cost per unit of output to the lagging group. In addition, three series have been reclassified: corporate profits from the roughly coincident to the leading group, and personal income and retail sales from the lagging to the roughly coincident group (see the preceding section).

It is interesting to note, more as an indication of the revolutionary changes during the past twenty years in the kinds of current statistics at our disposal than anything else, that of the twenty-one indicators selected by Mitchell and Burns in 1937, only three remain on our new list: business failure liabilities (8.0), industrial production index (15.0), and average workweek in manufacturing (1.0). In the case of many of the others, we now have a more comprehensive measure of the same type of economic activity. In addition, some economic processes are now represented among the indicators because monthly or quarterly statistics have

TABLE 3.2

Leads and Lags of Twenty-six Statistical Indicators (1960 List) at Business Cycle Peaks and Troughs

Indicator[a]	NUMBER OF				Median Lead (−) or Lag (+) (mos.)	*Longest*	
	Leads	*Coincidences*		*Lags*		Lead (mos.)	Lag (mos.)
		Exact	*Rough*[b]				
Leading Group							
Sensitive employment and unemployment indicators							
1.0* Average hours worked per week, mfg.	11	2	4	2	−6	−20	+5
2.0 Gross accession rate, mfg.	17	2	7	0	−4	−35	0
3.0 Layoff rate, mfg., inverted	18	0	6	0	−6	−27	−1
New investment commitments							
4.0* New orders, durable goods industries, value	14	1	6	0	−5	−35	0
5.0 Housing starts, no. of new dwelling units	14	1	4	1	−6	−31	+8
6.0* Commercial and industrial building contracts, fl. sp.	11	1	8	3	−2	−32	+3
7.0 Net change in number of operating businesses (Q)	33	2	14	7	−4	−33	+21
Profits, business failures, and stock prices							
8.0* Business failures, liabilities, indus. and comm., inverted	30	2	5	3	−7	−28	+7
9.0* Corporate profits after taxes (Q)	12	3	10	2	−2	−20	+1
10.0 Common stock price index, industrials, rails and utilities	31	2	14	5	−4.5	−21	+9
Inventory investment and sensitive commodity prices							
11.0 Change in business inventories (Q)	7	0	3	1	−10	−26	+1
12.0 Industrial materials spot market price index	11	3	8	3	−2	−29	+9
Roughly Coincident Group							
Employment and unemployment							
13.0* Employment in nonagricultural establishments	11	13	22	8	0	−20	+10
14.0 Unemployment rate, inverted	4	2	6	5	0	−10	+5

Production							
15.0* Industrial production index	15	11	21	8	0	−15	+10
16.0* Gross national product, in current prices (Q)	6	2	11	5	0	−5	+4
17.0 Gross national product, in constant prices (Q)	4	1	5	1	−2	−5	+1
Income and trade							
18.0* Bank debits outside NYC	19	3	22	11	−1	−10	+10
19.0* Personal income	9	3	12	5	−1	−12	+9
20.0* Sales by retail stores	3	3	8	6	+0.5	−7	+9
Wholesale prices							
21.0* Wholesale price index, excl. farm prod. and foods	3	1	10	9	+1	−15	+7
Lagging Group							
22.0 Plant and equipment expenditures (Q)	2	4	14	12	+1	−3	+6
23.0 Wage and salary cost per unit of output, mfg.	0	0	1	12	+6.5	+3	+24
24.0* Manufacturers' inventories, book value	3	0	4	11	+2.5	−9.5	+12.5
25.0* Consumer instalment debt	1	0	3	7	+4.5	−1.5	+7.5
26.0* Bank interest rates on short-term business loans (Q)	1	1	5	15	+5	−20	+39

NOTE: For sources of current data, see Table 3.7 in the appendix to this chapter. For historical sources, descriptions, and data through 1958, see Volume II. Data are available monthly or oftener, except as indicated (Q = quarterly). For detailed record of leads and lags, see Appendix B.

* Included in 1950 list of indicators. See Chapter 7, Table 7.11.

[a] The timing record of each indicator includes entries derived from related historical series where such are available for earlier cycles. For the titles of these series and the detailed record, see Appendix B.

[b] Includes leads or lags of 1–3 months and exact coincidences.

CHART 3.2

Twenty-six Statistical Indicators (1960 List), 1948–60

A. Twelve Leading Indicators

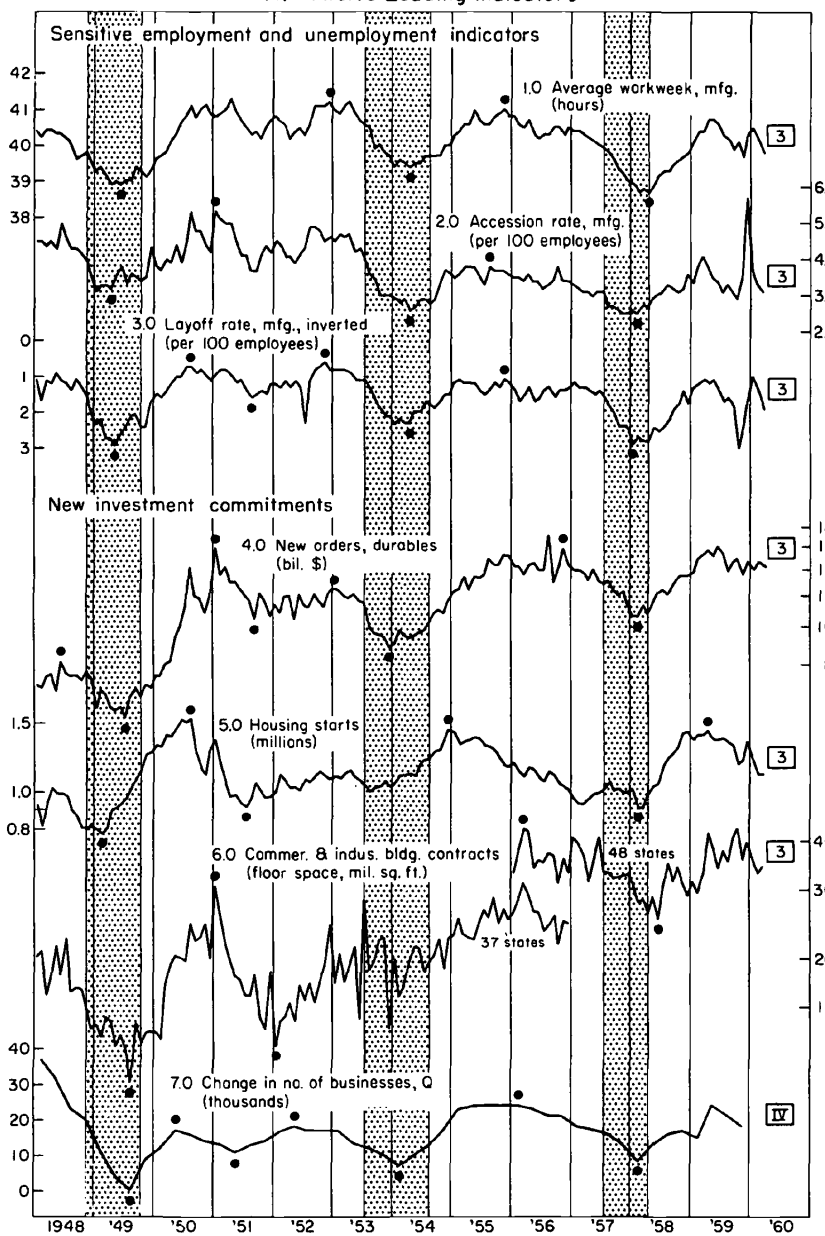


CHART 3.2 (continued)

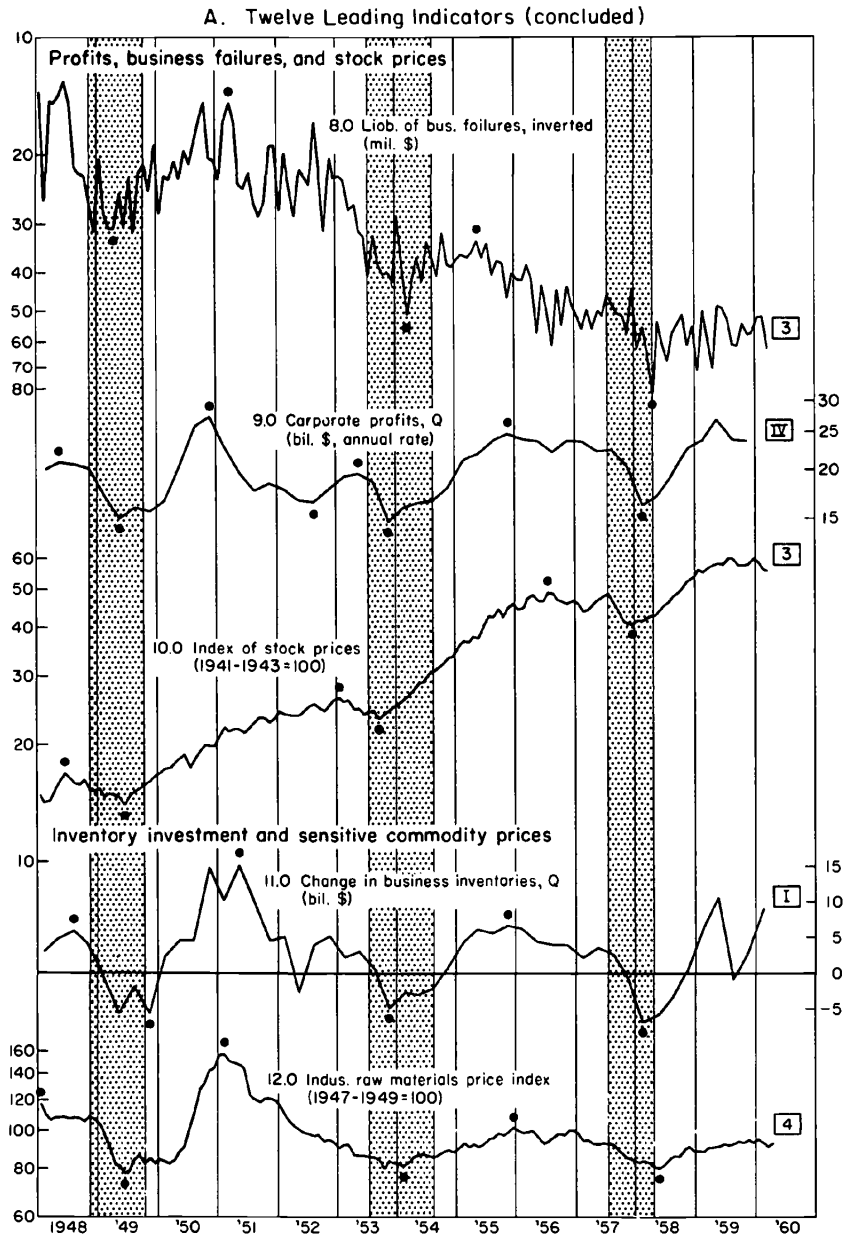


CHART 3.2 (continued)

B. Nine Roughly Coincident Indicators

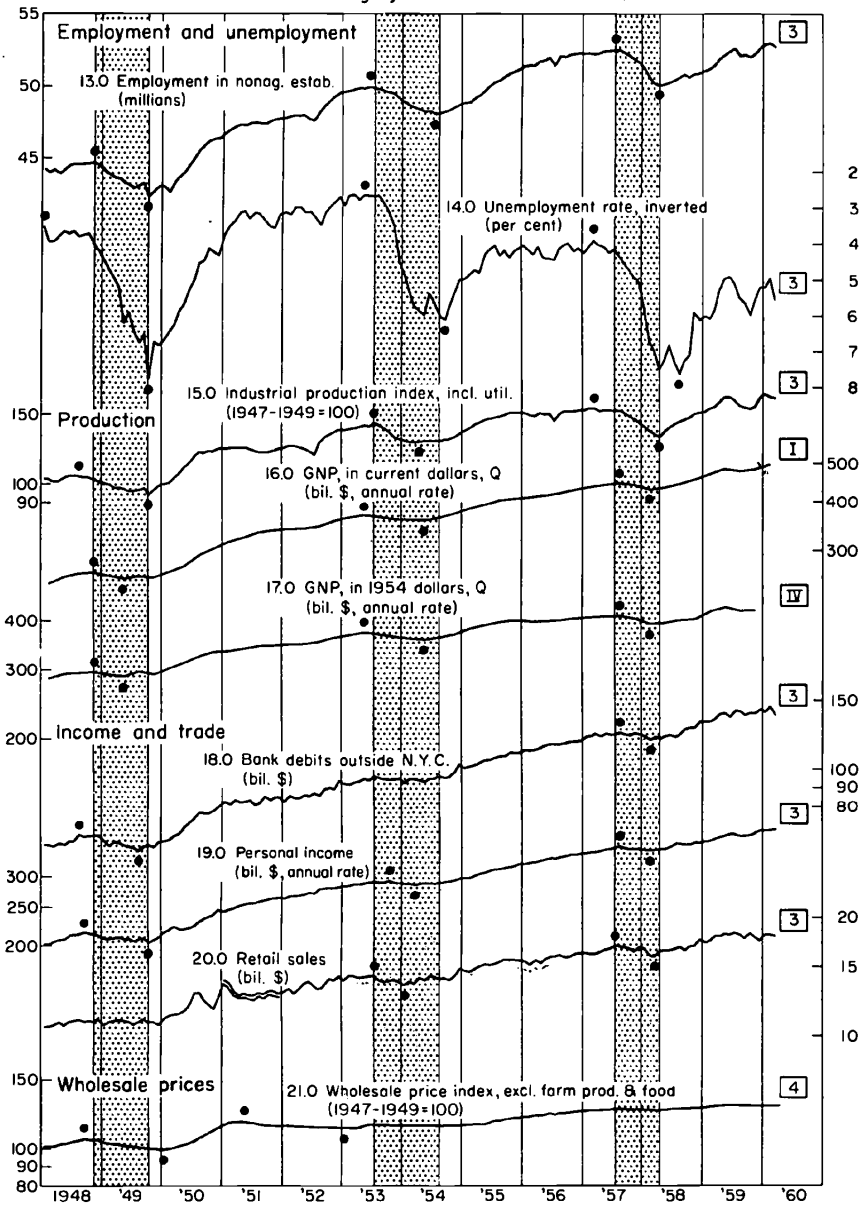
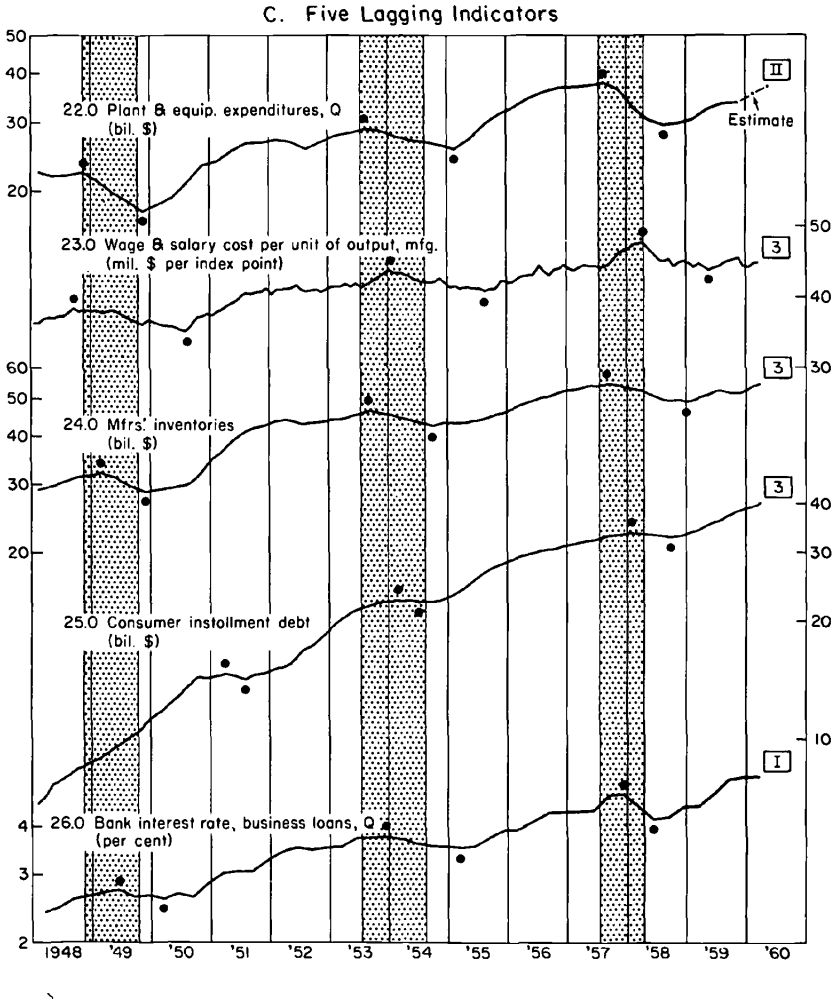


CHART 3.2 (concluded)



Ratio scales used throughout except for curves 1.0, 2.0, 3.0, 7.0, 11.0, 13.0, 14.0, and 23.0.

Figures enclosed in rectangular boxes indicate the latest data plotted: Arabic numerals indicate months; Roman numerals, quarters.

Dots identify peaks and troughs of specific cycles.

Shaded areas represent business contractions; unshaded areas, expansions.

SOURCE: Volume II.

become available where before only annual figures existed: gross national product, corporate profits, and inventories, for example.

As in any process of selection from a wide field, the margin of choice between one indicator and another is often narrow. In order to widen the range and record the merits, as cyclical indicators, of other series besides the twenty-six listed in Table 3.2, a supplementary list is provided in Appendix B. The supplementary series measure somewhat different facets of the same economic processes. They include, among others, all the series from the 1950 list that are not on the new list. Also included are some series that, had they been readily available, might have been put on the new list. For example, the series on new investment orders and contracts (6.2) is a better measure of the commitment stage of investment in plant and equipment than any series on the new list, but its components are not as yet currently published. On the other hand, some of the supplementary series are available more promptly but are less comprehensive or more erratic than those on the new list. For instance, the series on temporary layoffs (3.1) is available more promptly than the layoff rate (3.0), and insured unemployment (14.4) is available weekly whereas total unemployment (14.2) and the unemployment rate (14.0) are monthly. Each user of indicators must decide for himself whether he wishes to obtain, say, a less comprehensive or more erratic figure at an earlier date. From this point of view, it is to be noted that seven of the indicators on the new list are available only quarterly. Perhaps in due course some or all of them will become available monthly. In some instances even now, a basis for constructing monthly estimates exists.

The timing record of leads and lags at business cycle turns for each of the indicators on the new list is summarized in Table 3.2 and shown in detail in Appendix B (together with the timing record for the supplementary list). Current sources of data are given in Table 3.7 in the appendix to this chapter and brief descriptions of the content of the series and their historical sources are provided in Volume II. Measures of erratic movements and periods of moving averages required to obtain a specified degree of smoothness in each series are shown in Table 3.8 in the appendix.

Although one of the chief purposes of this book, especially of Part Two, is to develop a documented account of the cyclical behavior of the indicators and their relations with one another and with other economic processes, it may be helpful to bring together some of the essential points from these analyses in notes for each of the twelve leading indicators on the new list. The notes do not give the evidence, and in some instances go beyond what is presented elsewhere in this book (references are provided). They are intended to suggest what economic significance attaches to each indicator and what reasons there are for supposing that its relation to

certain other economic processes is such "that its future behavior in regard to business cycles will be like its past behavior" (Chapter 6, p. 166). Although the notes are restricted to the leading indicators, most of the others are mentioned in one connection or another—this being a token of their essential interdependence.[12]

SENSITIVE EMPLOYMENT AND UNEMPLOYMENT INDICATORS

1.0 Average Hours Worked per Week, Manufacturing. Changes in the workweek are usually made before corresponding changes in the number employed because changes in hours are easier to administer, easier to reverse if necessary, and sometimes reduce costs per hour (as when overtime hours are reduced). These leads, averaging about four months, have been found in numerous manufacturing and nonmanufacturing industries. In manufacturing, however, the cyclical movements in the workweek have been more sharply defined than in more comprehensive workweek data. Diffusion indexes of the workweek, based on individual industry data, lead the workweek proper and help to identify cyclical turns in it. Cyclical turns in the gross accession rate in manufacturing (2.0) also usually lead those in the workweek, and so do those in the layoff rate, inverted (3.0). For a full account of these relationships, see *The Average Workweek as an Economic Indicator* by Gerhard Bry (Occasional Paper 69, New York, NBER, 1959). See also Chapters 15 and 16.

2.0 Gross Accession Rate, Manufacturing. Changes in the accession rate

[12] The two additions to the lagging group require comment. The series on plant and equipment expenditures (22.0), representing one of the later stages of the investment process, has tended to lag only briefly behind business cycle turns. Although the lags far outnumber the leads, the series might almost equally well be classed as "roughly coincident." According to the entries in Table 3.2, which are based on quarterly data on expenditures by manufacturing industries during 1919–38 and by all nonfarm industries since 1947, there are 12 lags at business cycle turns, 2 leads, and 14 "roughly coincident" turns (leads or lags of 1–3 months and exact coincidences). The median of all timing observations is a lag of one month. These figures are based on a comparison of quarterly turns in the series, dated at the midmonth of the quarter, with the monthly business cycle dates. Comparison with the quarterly business cycle dates yields 8 lags of one quarter and one of two quarters, 8 exact coincidences, and one lead of one quarter (cf. note 8).

Wage and salary costs per unit of manufacturing output (23.0), as well as the related series covering only production worker wage costs (23.1) and the more comprehensive labor cost per dollar of real GNP (23.2), have consistently increased during the late stages of business expansions and the early stages of contractions, and declined during the late stages of contractions and early stages of expansions. Hence these unit costs can be described as conforming positively to business cycles with a lag, or inversely with a lead. This behavior is partly attributable to the vigorous rise in wage rates and hourly earnings after a business expansion gets under way, and their slower rise or actual decline after a business contraction begins, and partly to the tendency for output per man-hour to rise most rapidly near the end of business contractions and the beginning of expansions. See Chapter 16; also, *Changes in Labor Cost During Cycles in Production and Business*, by Thor Hultgren, Occasional Paper 74, New York, NBER, 1960, and *The Behavior of Wage Rates during Business Cycles*, by Daniel Creamer, Occasional Paper 34, New York, NBER, 1950.

reflect the varying intensity of employers' efforts to increase the number of persons they employ. Usually a number of months elapses after a downturn in the accession rate before it is reduced below the level of the separation rate (principally quits and layoffs), and a decline in employment ensues. During this interval the workweek begins to fall. A similar sequence follows upturns in the accession rate. Turns in help-wanted advertising in newspapers (14.5) usually follow those in gross accession rates and the workweek by a few months.

Since the hiring of labor is influenced by wage rates, labor costs per unit of output (23.0–23.2), and profits (9.0–9.3), as well as by the establishment of new business enterprises and the liquidation of others (7.0–7.3, 8.0–8.2), these series are particularly useful in analyzing cyclical movements in the accession rate. Brief discussions of the accession rate will be found in Chapters 15 and 16. See also "Three BLS Series as Business Cycle Turn Signals," by Rudolph C. Mendelssohn, *Monthly Labor Review*, September 1959.

3.0 Layoff Rate, Manufacturing. Since layoffs constitute the chief instrument whereby cyclical changes in unemployment occur, the layoff rate is a strategic series for analyzing prospective changes in the level of employment and unemployment. Layoffs are akin to additions to unemployment and to reductions in employment, except insofar as those laid off immediately obtain another job. Cyclical turns in the layoff rate, which is the number laid off per hundred employed in manufacturing, have nearly always preceded turns in unemployment (14.0–14.3) and opposite turns in nonagricultural employment (13.0 and 13.3).

The number of persons on temporary layoff (3.1) has a broad industrial coverage, but is far more erratic than the manufacturing layoff rate, probably because the figures are based on a much smaller sample. Data on temporary layoffs are available more promptly each month than the layoff rate, and are comparable with other labor force data. In fact, the number of unemployed (14.2) includes temporary layoffs. The number of initial claims for unemployment insurance (3.2) also may be considered in the same family as the layoff rate and temporary layoffs. Initial claims data are available weekly and by geographic area (see Chapter 18). For brief discussions of the layoff rate and related series, see Chapters 15 and 16.

NEW INVESTMENT COMMITMENTS

4.0 New Orders, Durable Goods Manufacturing Industries, Value. New orders for durable goods is one of a large number of series that represent, directly or indirectly, investment commitments by business enterprises or individuals. Numerous studies have demonstrated that the volume of activity in these early stages of the investment process tends to turn up or

down before the aggregate volume of economic activity, as measured by output, income, employment, or trade. (See Wesley C. Mitchell, *What Happens during Business Cycles*, NBER, 1950, pp. 68–72, 158–70.) New orders for durable goods in particular have shown a pervasive tendency to lead business activity in general as well as the output of the industry receiving the orders. Among the factors associated with the early declines in orders during business expansions are unfavorable cost-price relations, tight credit conditions, and piling up of inventories. Opposite conditions are associated with the early upturns in new orders during contractions. Data on unfilled orders are valuable adjuncts to new orders statistics, since high backlogs may reduce the significance or delay the effect of changes in new orders.

For an account of the cyclical timing of new orders, see Chapter 14. See also "An Approach to Orders Analysis," by Walter W. Jacobs and Genevieve B. Wimsatt, *Survey of Current Business*, December 1949. Additional orders series, including diffusion indexes, are listed in Volume II.

5.0 Housing Starts, Number of New Dwelling Units. Since the series on housing starts represents an early stage in the construction process, it leads residential construction employment and expenditures, tends to lead production of construction materials and appliances incorporated in new housing, and has a bearing on demand for furniture and other household furnishings. New orders for certain materials used primarily in new housing, such as oak flooring, are closely related to starts. So, too, are residential mortgage commitments. The starts figures, derived primarily from building permit statistics, are less erratic in their month-to-month movements than residential building contract awards (5.1), are currently published more promptly than the contract figures, and are published in seasonally adjusted form. The contract data, however, are available in terms of floor space and value as well as number of dwelling units. Since the starts are derived primarily from building permit statistics on the basis of estimated lags between permit issuance and start of construction, the original permit data show short leads relative to starts. From 1956 the contracts series also is based largely on permit data.

Housing starts are sensitive to financial market conditions, construction costs, marriage rates, vacancy rates, and changes in housing legislation. For analyses of some of these factors, see *Housing Issues in Economic Stabilization Policy*, by Leo Grebler (Occasional Paper 72, New York, NBER, 1960), and "Forward Investment Commitments of Life Insurance Companies," by James J. O'Leary, in *The Quality and Economic Significance of Anticipations Data* (Special Conference Series 10, Princeton for NBER, 1960).

6.0 Commercial and Industrial Building Contracts, Floor Space. Like new orders for equipment and housing starts, contracts for the construction of factory and office buildings are a type of investment commitment, and

are affected by similar influences (cf. notes on series 4.0 and 5.0). These contracts, however, are more closely correlated with the level of business activity than are housing starts, and probably are less sensitive to financial market conditions. The monthly figures are highly erratic, although the floor space figures are less so than the values. Quarterly estimates of new capital appropriations (6.3), which begin in 1953, have been closely correlated with commercial and industrial contract awards. Because of the long period of construction, both series lead plant and equipment expenditures (22.0) by intervals averaging from six to nine months. Series 6.2 combines new orders for industrial equipment (6.1) with contracts for industrial, commercial, and public utility construction and hence approximates the coverage of plant and equipment expenditures (see Chapter 14).

7.0 Net Change in Number of Operating Businesses. This series, which is the number of newly established business enterprises minus the number discontinued, has recently been put on a quarterly, seasonally adjusted basis and on a prompt publication schedule. Although the number of new incorporations (7.1) has the advantage of monthly publication, it is occasionally affected strongly by changes in legislation, especially in the tax laws, which induce existing businesses to incorporate or to refrain from doing so. Partly for this reason, and partly because the net change takes account of discontinuances, the conformity of the net change to business cycles in the postwar period has been better than that of new incorporations or even the new business component of the net change (see Chapter 13).

The lead in the net change of the business population relative to business activity derives primarily from the behavior of the number of new businesses, since the number of discontinued businesses (failures plus other discontinuances) is roughly coincident (inverted). As in the case of other forms of investment commitment, the cyclical timing of new business formation is associated with the behavior of profits. Widespread increases in profits and profit margins seem to induce, after a brief lag, the creation of large numbers of new businesses. As costs rise and profit increases become less widespread in the later stages of a business cycle expansion, the number of new businesses diminishes. Business contraction reduces new business formation, but before the decline in aggregate activity comes to a halt an increase in the number of firms and industries experiencing rising profits induces a rise in business births. For these reasons, and because the effect on investment of the creation of a new firm is not equal and opposite to that of the discontinuance of an existing enterprise, it is desirable to analyze business births and deaths separately, as well as the net change. For analyses of the cyclical timing of new incorporations and business births, see Chapter 13; also G. Herberton Evans, Jr., *Business Incorporations in the U.S., 1800–1943*, New York, NBER, 1948.

PROFITS, BUSINESS FAILURES, AND STOCK PRICES

8.0 Business Failures, Liabilities, Industrial and Commercial. Although relatively few businesses fail, and the ostensible reasons for failure are often not connected with the general state of business, the total number and aggregate liabilities of business failures usually decline as business improves and rise as business deteriorates. As a rule, the liabilities not only lead business activity but also the number of failures, reflecting a tendency for the failures of larger concerns to move ahead of those of smaller concerns. Hence it is useful to observe the number of the larger failures, e.g. those with liabilities of $100,000 or more (8.1 and 8.2). In general, data on liabilities are more erratic than the corresponding numbers of failures.

The large failures begin to increase before aggregate economic activity turns down, probably as a result of a deterioration in conditions affecting profits in the late stages of a business expansion. Higher costs, tighter credit, and more exacting competitive conditions—all play a role. Large failures continue to increase during the business contraction but typically reach their peak and start declining before aggregate economic activity turns up. Improvements in profit prospects in an increasing number of industries, reductions in new business starts (which not only have a high mortality rate but also stiffen competition), and reduced financial strains help to explain this "lead." The lag of small failures behind large failures may reflect delays occasioned by a lack of knowledge of the true condition of the concern and the smaller losses that creditors have at stake. For an analysis of the timing of business failures, see Chapter 12.

9.0 Corporate Profits after Taxes. Actual and prospective profits play a vital role in the generation of business cycles. By providing the incentive as well as the wherewithal for investment, by generating optimism or pessimism about the business outlook, by stimulating expansion or forcing retrenchment, profits (and losses) occupy a strategic position in a private enterprise economy.

For this reason it is well to keep currently in view various aspects of the statistical picture of profits—profits before as well as after taxes, retained earnings, profit margins per dollar of sales (9.3) and per unit of output, the proportion of concerns making profits vs. those incurring losses (9.2), and the proportion experiencing increases in profits vs. those with declines (D 9.0, D 9.2). It is also well to analyze current trends in factors affecting profits, such as new orders received (4.0), sales, prices (21.0), and costs (23.0), and in factors reflecting profit expectations, such as common stock prices (10.0), new businesses started (7.0), new orders and contracts placed (6.2), and new capital appropriations (6.3).

For descriptions of the cyclical behavior of profits see Chapters 2, 8,

11, and 12. The classical account of the role of profits in business cycles is in Wesley C. Mitchell's *Business Cycles*, Berkeley, 1913; see reprinted Part III, *Business Cycles and Their Causes*, Berkeley, 1941, especially pp. 149–162.

10.0 Common Stock Price Index, Industrials, Rails, and Utilities. Among the factors associated with the regularities in the behavior of stock price indexes during business cycles, probably the most significant are profits and interest rates. Declines in the level or rate of growth of profits or in factors portending such declines—e.g. in profit margins (9.3) or new orders (4.0)—during the later stages of business cycle expansions may alter appraisals of common stock values and hence produce a decline in stock prices before the downturn in business. At the same time, higher interest rates and reduced availability of credit tend to lower capital values, cause postponement of plans to exploit potentially profitable investment opportunities, and make common stocks a relatively less attractive form of security to hold and diminish incentives to borrow for that purpose. Opposite changes occur during business contractions. Since these factors also affect investment commitments, such commitments often move closely with stock prices.

For analyses of the cyclical timing of stock prices, see Frederick R. Macaulay, *The Movements of Interest Rates, Bond Yields, and Stock Prices in the United States since 1856*, New York, NBER, 1938; Arthur F. Burns, *Stock Market Cycle Research*, New York, 1930; W. Braddock Hickman, *The Volume of Corporate Bond Financing*, Princeton for NBER, 1953; *Factors Affecting the Stock Market*, Staff Report to the Committee on Banking and Currency, United States Senate, April 30, 1955; Edmund A. Mennis, "Security Prices and Business Cycles," *Analysts' Journal*, February 1955. For a diffusion index of stock prices, see Chapter 18.

INVENTORY INVESTMENT AND SENSITIVE COMMODITY PRICES

11.0 Change in Business Inventories. Additions to or reductions in business inventories (the value of the physical change) represent one of the most volatile components of gross national product (16.0), and have since 1939 shown a persistent tendency to reach cyclical turns, especially peaks, before GNP. These leads do not mean that inventory change becomes *negative* before peaks in output, but merely that the increases become smaller, exerting a depressing influence on output. Similarly, inventory change does not ordinarily become positive before troughs in output; rather, the decreases become smaller, tending to lift output. Evidence analyzed in a forthcoming report by Thomas M. Stanback indicates that it is the purchased materials component of total inventory change that is primarily responsible for the early timing of the total (cf. *Thirty-ninth Annual Report of the National Bureau of Economic Research,*

May 1959, pp. 43–44). There is evidence, also, that the timing has become earlier since World War II (cf. series 24.0).

For an account of the timing of inventory change, see the Stanback report mentioned above, and Moses Abramovitz, *Inventories and Business Cycles* (New York, NBER, 1950). A crude monthly index of inventory change can be obtained by taking month-to-month changes in the book value of total business inventories (manufacturers', wholesalers', and retailers'). This is affected by inventory revaluations and hence moves differently from the value of the physical change when price movements are extensive.

12.0 Industrial Materials Spot Market Price Index. This index includes the daily prices of thirteen raw, or simply processed, materials (steel, copper and lead scrap, tin, zinc, rubber, hides, cotton, wool, print cloth, burlap, rosin, and tallow) selected for sensitivity to forces acting on open markets and organized exchanges. Pressures to build or to draw down materials inventories tend to be reflected promptly in the index (see Ruth P. Mack, "The Destabilizing Influence of Raw Materials Prices," Compendium on *The Relationship of Prices to Economic Stability and Growth*, Joint Economic Committee, 85th Congress, 2nd Session, March 1958). Its cyclical upswings and downswings usually begin before those in the comprehensive wholesale price index (21.0), which includes quotations that sometimes remain fixed for long periods. Retail price indexes usually lag still more.

The materials price index is a component of the BLS daily index of basic commodity prices (12.2). In recent years it has conformed more closely to business cycles than the total, which includes prices of foodstuffs that are subject to the vagaries of weather conditions and government farm price policies.

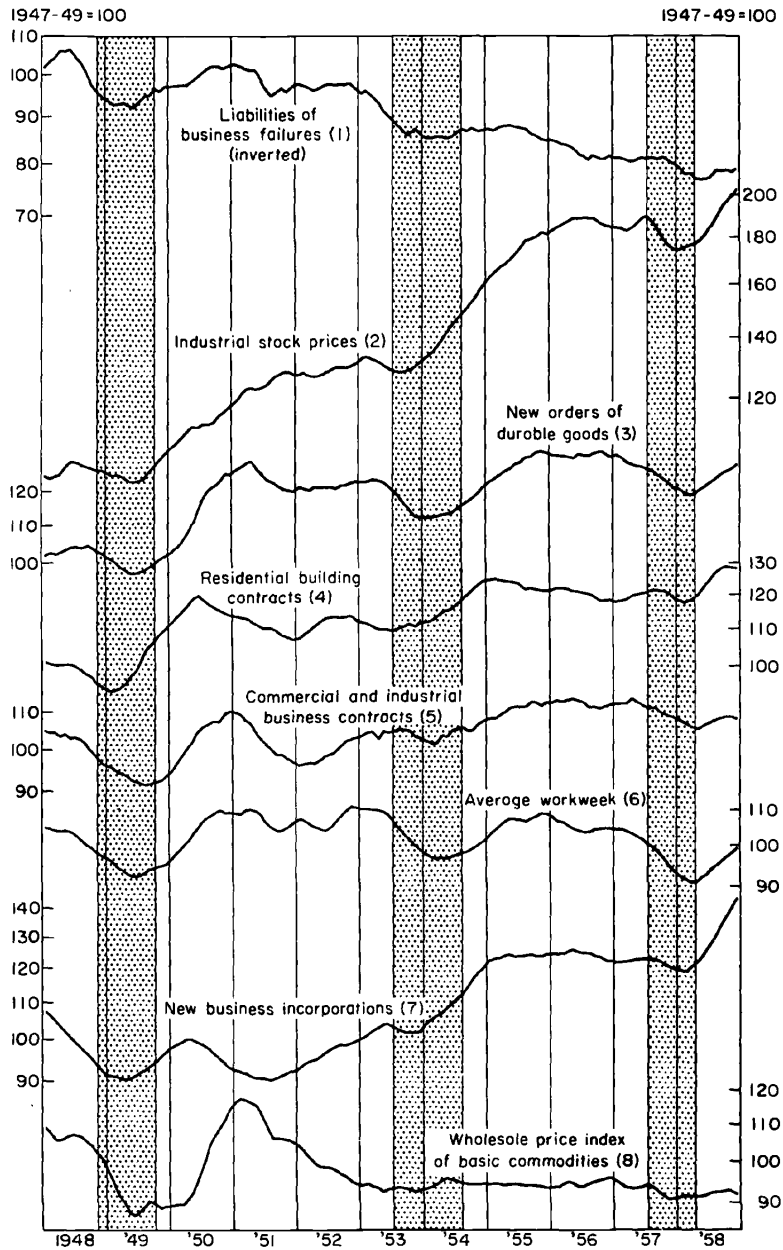
An Amplitude-Adjusted Index of Leading Indicators

Returning to the problem of testing the indicators (in the ensuing sections the 1950 list of twenty-one indicators is used), we may note certain weaknesses in the method of observing leads and lags. The decline in a particular indicator during, say, a business cycle contraction may not be sufficiently clear, or large enough, or long enough, to warrant identifying the decline as cyclical, in which case no lead or lag will be recorded. Yet the movement may conform to the business cycle and even exhibit a lead or lag. For example, in Chart 3.2, commercial and industrial building contracts (series 6.0) reached a low point during the 1953–54 contraction; this low led the business cycle trough, but it is not recorded as a lead in Chart 3.3 because the decline was not considered large or long enough to be marked as a cyclical contraction.

The idiosyncrasies of individual indicators will, of course, tend to

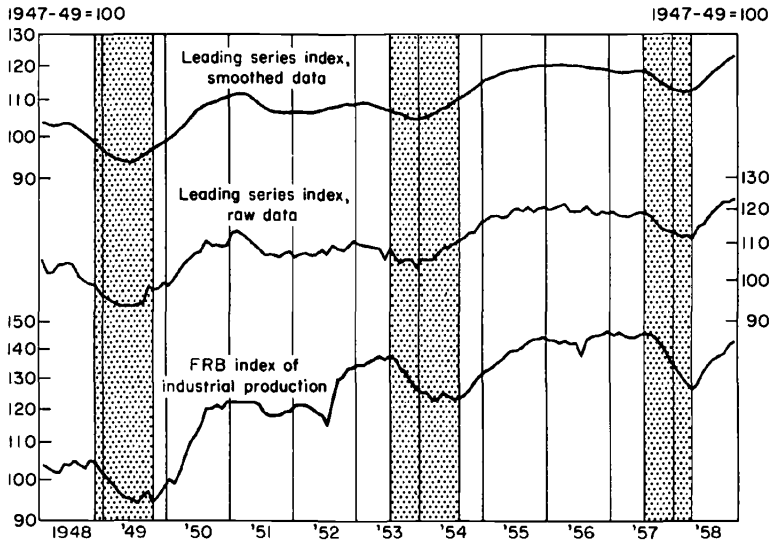
CHART 3.3

Leading Indicators, Adjusted for Cyclical Amplitude and Smoothed,[a] 1948–58



Ratio scales.

CHART 3.3 (concluded)



Ratio scales.
[a] The span of the moving average used to smooth each series is shown in Table 3.3. Shaded areas represent business contractions; unshaded areas, expansions.

disappear if they are combined in an index number. Such an index would enable us to judge the performance of an entire group of indicators. One of the problems, however, in constructing an index is to prevent those indicators that typically move in large cyclical swings, such as new orders, from completely swamping those that move in small swings, such as the average workweek. A solution to this problem is illustrated in Chart 3.3.

Each of the eight leading indicators is adjusted so that it has approximately the same cyclical amplitude, on the average, as one of the coincident indicators, the Federal Reserve Board index of industrial production. The adjusted series are also smoothed by moving averages, though this is not essential. The amplitude adjustment converts the cyclical swings in the several indicators to roughly the same average size, but does not alter the relative magnitudes of the successive swings in each indicator. The adjusted series are then combined into an index, as shown. Since the adjusted series have roughly equal cyclical amplitudes, their cyclical influence on the index is roughly equal. The index broadly parallels the production index, but leads it by intervals in the neighborhood of four to six months.[13]

[13] For further discussion of this index, see Chapter 19. For another type of amplitude adjustment, see Chapter 18.

Diffusion Indexes of Business Indicators

Another device that can be used to summarize the movements of groups of series is a diffusion index, as shown in Chart 3.4. This is a simple scheme for counting the directions of change in a group of indicators and producing a sort of index number. The idea is merely to count the number of items in any group that are rising at any given time, and to take this as a percentage of the total number in the group. This is the percentage expanding. If more series in the group are rising than falling, the percentage will be above 50; if more are falling than rising, it will be below 50. The percentage is called a diffusion index because it shows how widely diffused expansion movements are in the sector observed.[14]

In some instances it will do to say that a series is rising if this month's figure, seasonally adjusted, is higher than last month's. But if the series is very erratic, it is better to take a longer view, and see whether this month's figure is higher than, say, three or six months ago. This way there is a better chance that cyclical movements will dominate the result. Unfortunately, however, the farther back we look, the less current our observation on the cyclical movement is likely to be, at least at the turning points. If inventories today are lower than they were a year ago, that *may* mean they are still declining, but it may not. Perhaps they turned up a month or two ago. When a series behaves in symmetrical fashion around its turning point, comparisons with the same month of the preceding year may tell us what the direction of cyclical movement was six months ago, not necessarily what it is now.[15]

For this reason it is desirable to "center" the observations on directions of change in the middle of the interval between the months compared, and bring them up to date by tentative approximations. In the case of an erratic series like liabilities of business failures, we determine its direction of change by comparing figures six months apart; smooth series, like manufacturers' inventories, are taken on a month-to-month basis.[16] This in itself tends to produce a smoother diffusion index; if the same interval were used for each series, erratic factors that may affect a number of series at once, such as a strike, would have a greater effect on the result.

The results of this process are recorded in Table 3.3. where the centered directions of change for each indicator are shown. This gives a vivid picture of how the recession of 1957–58 and the subsequent recovery spread to different economic activities at different times. Despite the

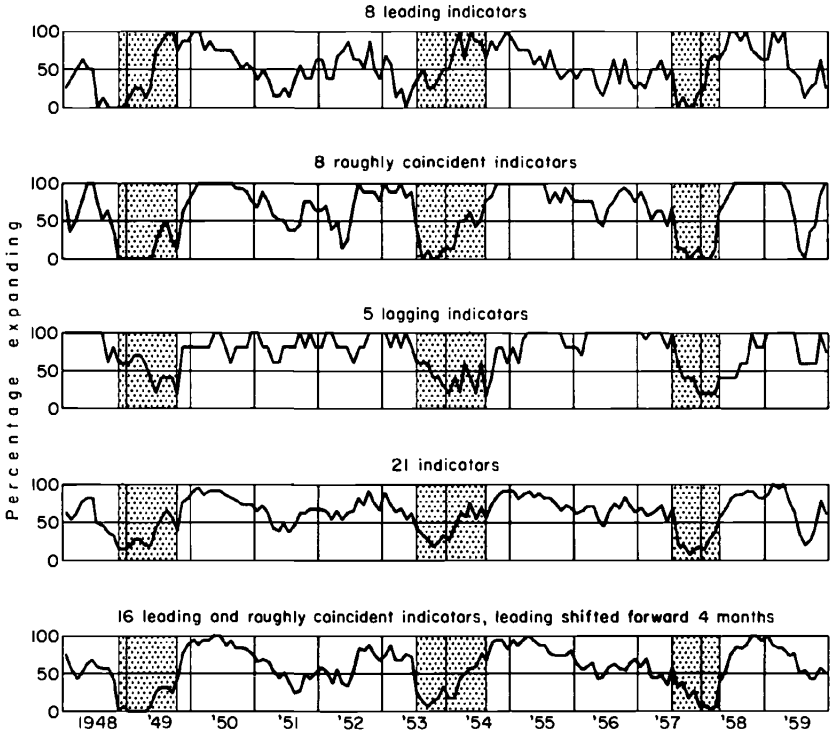
[14] For the series that usually decline when business rises and vice versa (e.g. business failures, unemployment), we reverse the observed direction of change in determining the number expanding. When a series shows no change, it is counted as one-half rising.

[15] For further discussion of this point, see Chapter 17.

[16] For the method of determining these intervals, see Chapter 7. For another method, which yields somewhat shorter intervals, see Chapter 17.

CHART 3.4

Diffusion Indexes of Business Indicators, 1948–59



Computed from directions of change in centered moving averages applied to each seasonally adjusted indicator; the number of rising indicators is taken as a percentage of the total number in the group.

Shaded areas represent business contractions; unshaded areas, expansions.

smoothing devices used, the diffusion indexes for the three groups of indicators are erratic.[17] Nevertheless, they furnish useful information about the movements of the indicators from which they are constructed. The

[17] Another way to present the information contained in a diffusion index is to compute what we call the cumulated net percentage expanding, by taking the net excess of the percentage expanding (+) over the percentage contracting (−) and cumulating these figures from month to month from the initial date of the index (or from any arbitrary date). The resulting index is usually relatively smooth, and it reaches its peaks and troughs when the ordinary diffusion index (percentage expanding) crosses the 50 per cent line.

Still another method of constructing a diffusion index is termed the average duration of run and is explained in Chapter 20. This type of index is ordinarily somewhat smoother than the percentage expanding, but it is more complicated to compute and to explain, and it often lags a month or two behind the latter (see Chapter 9).

TABLE 3.3

Diffusion Indexes and Directions of Change of Twenty-one Economic Indicators, 1956–58

Indicator	Span in Mos.	1956 J	F	M	A	M	J	J	A	S	O	N	D
Leading Group													
1. Business failures, liabilities, inverted	6	−	−	−	−	−	−	−	+	−	−	+	−
2. Industrial stock prices	4	+	+	+	+	+	+	−	−	−	−	−	−
3. New orders, durable goods mfrs.	6	−	−	−	−	+	−	−	+	+	+	−	+
4. Constr. contracts, residential, fl. sp.	6	+	+	−	−	−	−	−	−	−	+	−	−
5. Constr. contracts, comm. & indus., fl. sp.	6	+	+	+	+	−	−	−	+	−	+	+	+
6. Aver. workweek, mfg.	4	−	−	−	−	−	−	+	+	0	+	−	−
7. New incorporations, no.	6	−	+	+	+	−	−	+	−	−	−	−	−
8. Prices, basic	3	−	+	+	+	−	−	+	+	+	+	+	+
Roughly Coincident Group													
9. Employment, nonagr., BLS	2	+	+	+	+	+	−	+	+	+	+	+	+
10. Unemployment, inverted	5	+	+	−	−	−	+	+	+	+	+	−	−
11. Bank debits outside NYC	6	+	+	+	+	+	+	+	+	+	+	+	+
12. Carloadings	5	+	+	+	+	−	−	−	−	−	+	+	−
13. Production, FRB	2	−	−	0	0	−	−	+	+	+	+	+	0
14. Prices, wholesale, exc. farm & food	2	+	+	+	+	+	0	+	+	+	+	+	+
15. Corp. profits after taxes (Q)	3	−	−	−	−	−	−	−	−	+	+	+	+
16. GNP (Q)	3	+	+	+	+	+	+	+	+	+	+	+	+
Lagging Group													
17. Personal income	2	+	+	+	+	+	+	+	+	+	+	+	+
18. Retail sales	4	−	−	+	+	+	+	+	+	+	+	+	+
19. Consumer instalment debt	1	+	+	+	+	+	+	+	+	+	+	+	+
20. Manufacturers' inventories	1	+	+	+	+	+	+	+	+	+	+	+	+
21. Bank rates on business loans (Q)	3	+	0	+	+	+	+	+	+	+	+	+	+
DIFFUSION INDEXES (PERCENTAGE RISING)													
Leading group		37.5	62.5	50.0	50.0	25.0	12.5	37.5	62.5	31.2	62.5	37.5	37.5
Roughly coincident group		75.0	75.0	68.8	68.8	50.0	43.8	75.0	75.0	87.5	100.0	87.5	68.8
Lagging group		80.0	70.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
16 leading & roughly coincident series with leading shifted forward 4 mos.		56.2	56.2	56.2	59.4	43.8	53.1	62.5	62.5	56.2	56.2	62.5	65.6
21 indicators		61.9	69.0	69.0	69.0	52.4	45.2	66.7	76.2	69.0	85.7	71.4	64.3

NOTE: Entries—rise (+), fall (−), no change (0)—are placed in the midmonth of the span or, if the midpoint falls between two months, in the later month. For example, when the span is six months, the change from January to July is entered in April, February to August is entered in May, etc. For five-month spans the change from January to June is entered in April, etc. Tentative entries can be made up to the month prior to the last available month of data by using successively shorter intervals. E.g., when the span is six months and the last available figure is July, a preliminary entry for May can be obtained by comparing February with July, and an entry for June by comparing March with July. Such entries use the correct initial month of the span and assume no change beyond the last available monthly figure. In the diffusion indexes, entries of no change are counted one-half rising and one-half falling.

TABLE 3.3 (continued)

Indicator	Span in Mos.	1957 J	F	M	A	M	J	J	A	S	O	N	D
Leading Group													
1. Business failures, liabilities, inverted	6	−	−	−	+	+	−	+	−	+	−	−	−
2. Industrial stock prices	4	−	−	+	+	+	+	−	−	−	−	−	+
3. New orders, durable goods mfrs.	6	−	−	−	−	−	−	−	−	−	−	−	−
4. Constr. contracts, residential, fl. sp.	6	+	+	+	+	+	+	+	−	−	−	−	−
5. Constr. contracts, comm. & indus., fl. sp.	6	+	−	+	−	−	−	−	−	−	−	−	−
6. Aver. workweek, mfg.	4	0	−	−	−	−	−	−	−	−	−	−	−
7. New incorporations, no.	6	−	+	+	+	+	−	−	−	−	−	−	−
8. Prices, basic	3	−	−	−	−	+	+	+	−	−	−	−	0
Roughly Coincident Group													
9. Employment, nonagr., BLS	2	+	+	−	+	+	+	+	−	−	−	−	−
10. Unemployment, inverted	5	+	+	+	−	−	−	−	−	−	−	−	−
11. Bank debits outside NYC	6	+	+	+	+	+	+	−	−	+	−	−	−
12. Carloadings	5	+	−	−	+	−	−	−	−	−	−	−	−
13. Production, FRB	2	0	0	−	−	+	+	0	−	−	−	−	−
14. Prices, wholesale, exc. farm & food	2	+	+	+	+	+	+	+	−	−	−	0	+
15. Corp. profits after taxes (Q)	3	−	−	−	−	−	−	+	−	−	−	−	−
16. GNP (Q)	3	+	+	+	+	+	+	+	+	−	−	−	−
Lagging Group													
17. Personal income	2	+	+	+	+	+	+	+	−	−	−	−	−
18. Retail sales	4	+	+	+	+	+	+	+	−	−	−	−	−
19. Consumer instalment debt	1	+	+	+	+	+	+	+	+	+	+	+	+
20. Manufacturers' inventories	1	+	+	+	+	+	−	+	+	−	−	−	−
21. Bank rates on business loans (Q)	3	+	0	+	+	+	+	+	+	+	+	+	−
DIFFUSION INDEXES (PERCENTAGE RISING)													
Leading group		31.2	25.0	50.0	50.0	62.5	37.5	37.5	0	12.5	0	0	18.8
Roughly coincident group		81.2	68.8	50.0	62.5	62.5	62.5	56.2	12.5	12.5	0	6.2	12.5
Lagging group		100.0	90.0	100.0	100.0	100.0	80.0	100.0	60.0	40.0	40.0	40.0	20.0
16 leading & roughly coincident series with leading shifted forward 4 mos.		56.2	65.6	43.8	50.0	46.9	43.8	53.1	31.2	37.5	18.8	21.9	6.2
21 indicators		66.7	57.1	61.9	66.7	71.4	57.1	59.5	19.0	19.0	9.5	11.9	16.7

TABLE 3.3 (concluded)

Indicator	Span in Mos.	1958 J	F	M	A	M	J	J	A	S	O	N	D
Leading Group													
1. Business failures, liabilities, inverted	6	−	+	−	−	−	+	+	−	+	−	+	−
2. Industrial stock prices	4	+	+	+	+	+	+	+	+	+	+	+	+
3. New orders, durable goods mfrs.	6	−	−	+	+	+	+	+	+	+	+	+	+
4. Constr. contracts, residential, fl. sp.	6	−	+	+	+	+	+	+	+	+	−	−	−
5. Constr. contracts, comm. & indus., fl. sp.	6	−	−	−	−	+	+	+	+	−	+	−	+
6. Aver. workweek, mfg.	4	−	−	0	+	+	+	+	+	+	+	+	+
7. New incorporations, no.	6	−	+	+	+	+	+	+	+	+	+	+	+
8. Prices, basic	3	+	+	+	−	−	+	+	+	+	+	0	−
Roughly Coincident Group													
9. Employment, nonagr., BLS	2	−	−	−	−	+	+	+	+	+	+	+	+
10. Unemployment, inverted	5	−	−	−	−	−	−	+	+	+	+	+	+
11. Bank debits outside NYC	6	−	−	−	+	+	+	+	+	+	+	+	+
12. Carloadings	5	−	−	−	+	−	+	+	+	+	+	+	+
13. Production, FRB	2	−	−	−	0	+	+	+	+	+	+	+	+
14. Prices, wholesale, exc. farm & food	2	−	−	+	+	+	+	+	+	+	+	+	+
15. Corp. profits after taxes (Q)	3	−	−	−	+	+	+	+	+	+	+	+	+
16. GNP (Q)	3	−	−	−	+	+	+	+	+	+	+	+	+
Lagging Group													
17. Personal income	2	−	+	+	+	+	+	+	+	+	+	+	+
18. Retail sales	4	−	−	−	+	+	+	0	+	+	+	+	+
19. Consumer instalment debt	1	+	−	−	−	−	−	−	−	−	+	+	+
20. Manufacturers' inventories	1	−	−	−	−	−	−	−	−	−	+	−	−
21. Bank rates on business loans (Q)	3	−	−	−	−	−	−	−	+	+	+	+	+
		DIFFUSION INDEXES (PERCENTAGE RISING)											
Leading group		25.0	62.5	68.8	62.5	75.0	100.0	100.0	87.5	87.5	75.0	68.8	62.5
Roughly coincident group		0	0	12.5	68.8	75.0	87.5	100.0	100.0	100.0	100.0	100.0	100.0
Lagging group		20.0	20.0	20.0	40.0	40.0	40.0	30.0	60.0	60.0	100.0	80.0	80.0
16 leading & roughly coincident series with leading shifted forward 4 mos.		6.2	0	6.2	43.8	50.0	75.0	84.4	81.2	87.5	100.0	100.0	93.8
21 indicators		14.3	28.6	35.7	59.5	66.7	81.0	83.3	85.7	85.7	90.5	83.3	81.0

diffusion indexes make it plain that the three groups have moved in sequence.

Chart 3.4 also shows a diffusion index based on all twenty-one series and, at the bottom, an index based on the eight leading and eight roughly coincident series with the leading group shifted forward four months, which was the average lead of this group in the prewar record. One of the merits of this last arrangement is that it spreads the impact of short-run fluctuations which may affect many series at the same time; the result is a smoother diffusion index. Also, of course, since the leading series are moved ahead by the amount of their average lead, the resulting diffusion index should move in a fashion approximately synchronous with the diffusion index for the roughly coincident series.

A further test of the behavior of the twenty-one indicators is shown in Chart 3.5. Here we show the several diffusion indexes as they stood at intervals during the 1957–58 and 1953–54 recessions and recoveries.[18] Bear in mind that the chart shows the picture as it looked toward the close of the months designated, which usually means that the latest available data were for the preceding month. In January 1958, three months before the business cycle trough was reached, nearly all the twenty-one indicators were moving down. At this point the latest data available were for December, in most instances, and there was no sign in these figures that the contraction was near its end. In this respect the situation looked less favorable than it did in May 1954, three months before the August 1954 upturn. By that time more than half of the leading indicators and a few of the coinciding ones had begun to rise.

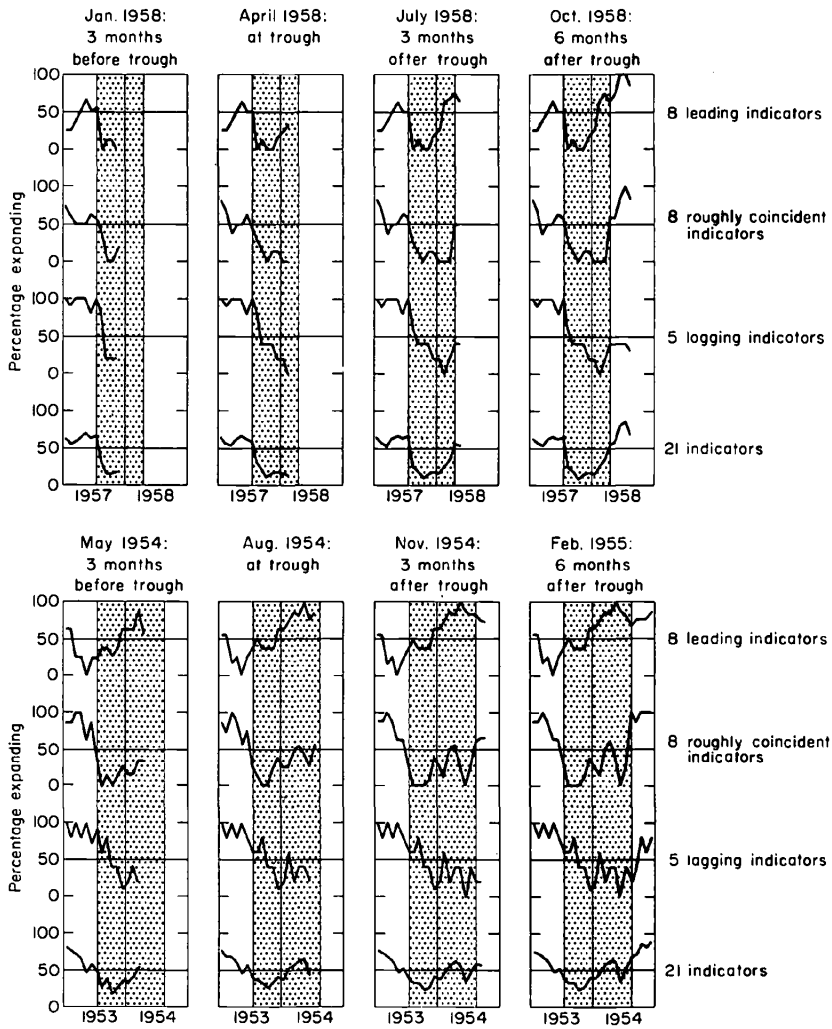
By April 1958, when March figures were available, there was evidence of modest improvement in some of the leading series, but all of the coinciding and the lagging series were moving down. Again the situation in terms of these series looked much less favorable than it did at the August 1954 turn.

During the next three months further improvement occurred, so that by July 1958 more than half the leaders had been rising for several months, and exactly half the coinciding indicators were rising. By October, expansion had become general, with all the leaders rising, nearly all the coincident indicators rising, and about half the lagging indicators rising. The 1958 reversal clearly came about much more swiftly than that of 1954. In this respect it resembled the sharp upturns in 1938 and 1924.

[18] The curves in successive panels differ slightly from one another and from those in Chart 3.4 for three principal reasons: (1) revised data for individual series subsequently became available; (2) seasonal adjustments for certain individual series were subsequently revised; (3) preliminary estimates of changes in moving averages of individual series, used to compute the percentage expanding, were revised when later data became available. For the same reasons, the contemporary record in Chart 3.5 differs slightly from that shown in Table 3.3.

CHART 3.5

Diffusion Indexes of Business Indicators During Recession and Revival, 1953–54, 1957–58



Each panel is based on the figures that were available toward the close of the month indicated, which in most instances means figures for the preceding month.

Shaded areas represent business contractions; unshaded areas, expansions.

It is important to be clear about what these results do *not* mean, as well as what they do mean. They do not mean that one can get much advance notice that a general business contraction is beginning or is coming to an end. They do help one to recognize these events at about the time they occur.[19] Even then there is some risk of error. For Chart 3.4 shows, and the other charts provide additional evidence, that the economy undergoes what might be called abortive movements that are fairly general and show some of the same symptoms, yet do not develop into the longer, deeper, and more general swings that we recognize as business cycles.

Properties of Diffusion Indexes

We have constructed and examined a large number of diffusion indexes, and have learned something about their properties and what they have to tell about the condition of the economy. Chart 3.6 contains a sprinkling of these indexes for the postwar period and Chart 3.7 carries the story back to 1919. Let me enumerate some of the conclusions of our studies, and illustrate them by reference to both charts.

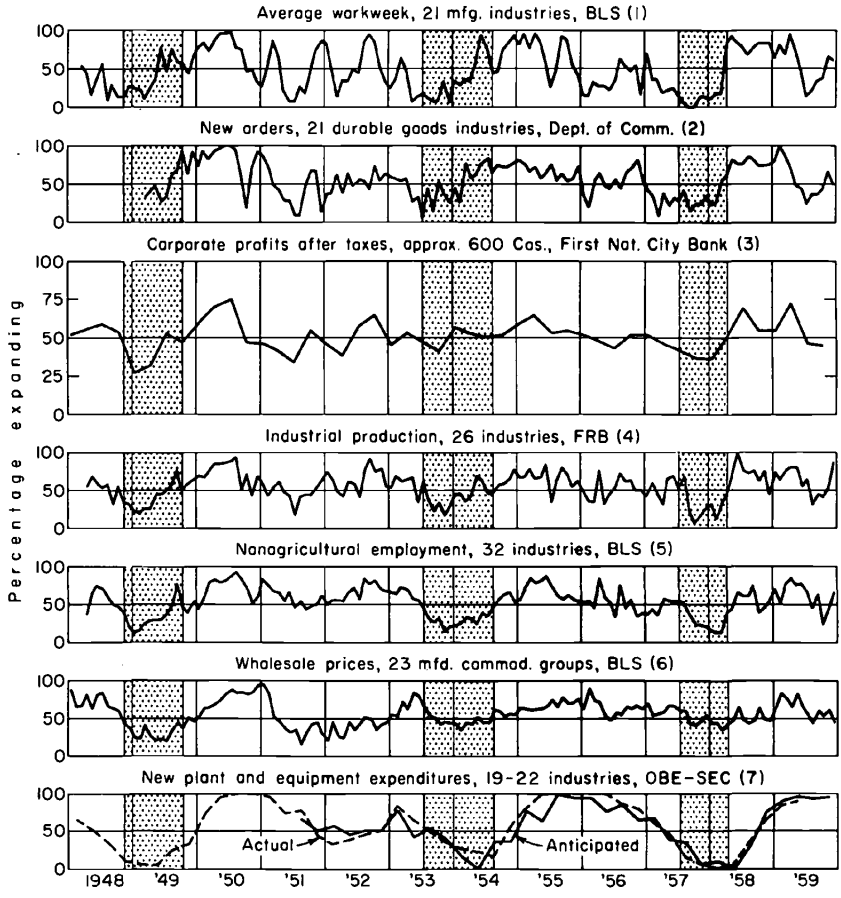
1. Cyclical movements in the economy are general, but far from perfectly general. For example, in the industrial production figures in Chart 3.6, in only two months during the recession of 1953–54 were more than three-quarters of the twenty-six major industry components of the FRB index declining from one month to the next. Since 1949, expansion has reached more than three-fourths of the industries at once in only a few scattered months in 1950, 1952, 1954–56, and 1958.

2. There is little evidence that cyclical movements have become either more or less general in recent years, i.e. that there has been a long-run *trend* one way or the other. Chart 3.7 provides some evidence on this point. The curve labeled "business indicators" is the same as the bottom curve on Chart 3.4, the combination of leading and coincident indicators with the former shifted forward four months. The curve labeled "153 series" is based on a sample of series representing a fair cross section of different types or aspects of economic activity. It is constructed by taking the directions of change in each series over a twelve-month interval—the familiar comparison with the same month of the preceding year. The result is plotted in the middle of the interval. For example, the most recent figure is plotted in June 1954, and it is based on a comparison, for each series, of December 1954 with December

[19] It is of interest to note, for example, that the July 1954 issue of *Business in Brief*, published by the Chase National Bank, contained the following statement: "At present all the leading indicators [selected by the National Bureau] point up, and half the coincident ones show an expanding trend. On this basis, the indicators point definitely to an upturn in business activity." The business cycle trough was subsequently dated August 1954.

CHART 3.6

Diffusion Indexes for Selected Economic Activities, 1948–59

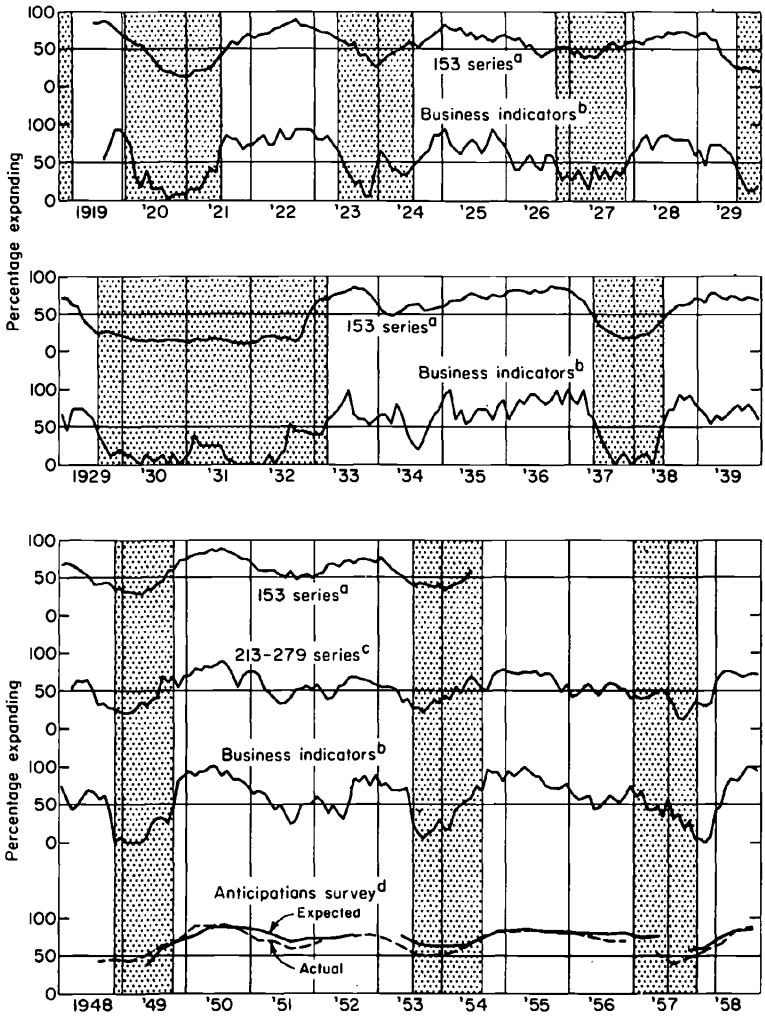


Indexes (4), (5), and (6) are based on directions of change in the component series from the preceding month; (3) on changes from the preceding quarter; (1), (2), and (5) over 3-month spans; and (7) over 4-quarter spans. Each index is plotted at the midpoint of the span (or when the midpoint falls between 2 months, at the second month). Based on seasonally adjusted components except (3) and (6), where the percentage expanding is adjusted, and (7), which requires no adjustment because a 4-quarter span is used.

Shaded areas represent business contractions; unshaded areas, expansions.

CHART 3.7

Four Types of Diffusion Index, 1919–39, 1948–58



[a] Based on directions of change from same month of preceding year, centered.

[b] Based on directions of change in centered moving averages of leading and roughly coincident series, with leading series shifted forward four months.

[c] Based on directions of change during three-month spans, centered. See Chapter 18.

[d] Dun and Bradstreet survey: manufacturers' sales. Based on directions of change from same quarter of preceding year, centered.

Shaded areas represent business contractions; unshaded areas, expansions.

1953. The point is that both of the diffusion indexes that cover the interwar period seem to be undergoing much the same sort of swing since the war that they did before the war. And when the interwar cycles are compared with those before World War I (cf. Chapter 7, Chart 7.3), it is clear that the phenomenon of imperfectly diffused cyclical movements is of long standing.

3. The leads or lags that certain types of aggregates or indexes exhibit relative to one another are usually reflected in diffusion indexes constructed from the components of the aggregates (see Chapters 8, 14, and 15). In Chart 3.6, for example, the diffusion index for the workweek in twenty-one manufacturing industries shows a rather consistent lead over the diffusion index for employment in all nonagricultural industries. Changes in the workweek become diffused throughout industry more promptly than changes in employment. A similar statement can be made about diffusion indexes for new orders compared with those for production. Plant and equipment expenditures, on the other hand, show a distinct lag, and so do prices.

4. The scope of a business cycle expansion diminishes before the peak in aggregate activity is reached, and the scope of a contraction diminishes before the trough in aggregate activity is reached. The shaded areas in the several charts represent our best judgment on the location of the contractions in aggregate economic activity. There seems to be a tendency, in most of the diffusion indexes we have constructed, for the indexes to reach their peaks and troughs some six to twelve months ahead of these peaks and troughs in aggregate activity, although the lead intervals have sometimes been shorter than six months and occasionally longer than twelve. A long historical record and an extensive array of data support this observation as Charts 3.6 and 3.7 show (see also Chapter 8). The latest illustration occurred in 1957–58. Most of the diffusion indexes in our collection reached troughs and began rising late in 1957 or early in 1958, indicating a decline in the scope of the contraction. But none of the principal aggregative measures of activity, such as income, employment, or production, reached their troughs before February 1958, and many continued to decline until April or later.

5. Once expansion in the economy has become *general*, when measured by a wide variety of factors bearing on the economic well-being of the country and in such a way that the *cyclical* movements in the factors are exposed, it stays general for a considerable period. These periods are usually longer than those in which contraction is general. The proviso about measurement is important, for it is also true that there are shorter swings that are often quite general, especially when the directions of change are measured over brief intervals of a month or two.

Chart 3.7 makes this point emphatically. The top line is based on

153 series covering such items as production and transportation, employment and hours of work, domestic and foreign trade, new orders and construction contracts, commodity prices, inventories, wage rates and earnings, interest rates, and financial activities. And each series is viewed in the perspective provided by a comparison with its level a year earlier. Over such an interval, broad cyclical swings are likely to dominate, especially if observation is confined to directions of change. And when the results are put together for the whole collection of series, this is what we find: the diffusion index remained above 50 per cent from August 1921 to August 1923, i.e. 25 months; from May 1924 to May 1926, again 25 months; from August 1927 to April 1929, 21 months; from December 1932 to April 1937, with a one-month interruption (in March 1934), 53 months; and from September 1949 to May 1953, again with an interruption of one month (in September 1951), 45 months. The index moved above 50 per cent again in June 1954. Similar broad swings are displayed by the diffusion index going back to 1885 in Chapter 7 (Chart 7.3), which is based not on the movements of the component series over uniform twelve-month intervals, but on movements between cyclical peaks and troughs identified historically in each series.

On the other hand, the diffusion index based on business indicators (Chart 3.7, third line) takes a shorter-run view. The current month's level of each indicator is compared with that of the preceding month or a few months earlier. Despite the fact that this index covers a rather wide variety of information (though it contains a much smaller number of separate series than the other indexes), and despite the smoothing effect produced by postdating the leading series, the index flutters around a good deal, and crosses above and below the 50 per cent line quite frequently. So, too, does the index (Chart 3.7, second line) comprised of nearly 300 series, which is based on a three-month span. The same is true of those indexes in Chart 3.6 which are based on short-run comparisons.

These considerations pose a dilemma. In order to detect major turns in the business cycle when they occur, one must take a short-run view; otherwise the turn will be discovered only long after the event. But the short-run view is likely to uncover minor as well as major turns.

One possible way out of the dilemma is suggested by the bottom curve on Chart 3.7, the anticipations survey. The Dun and Bradstreet survey of manufacturing concerns, wholesalers, and retailers inquires whether sales, orders, employment, prices, profits, and inventories are up or down in the most recent quarter compared with a year ago. The percentage of companies reporting increases in sales is the line labeled "actual." The survey also asks about expected results in the second quarter ahead compared with the same quarter a year earlier. The actual and expected

points are each plotted in the middle of the year to which they refer, although the expected figure was available six months earlier than the actual.[20] Both the actuals and the expecteds trace a smooth course broadly similar to that followed by the other diffusion indexes. However, the expecteds appear to lag behind the actuals by about one quarter. Except for the lag, one could say that the expectations offer a way of bringing comparisons based on a yearly interval virtually up to date. For another example, see the actual and expected diffusion indexes for plant and equipment expenditures in Chart 3.6.

What the analyst must do to get out of the dilemma caused by the short-run ups and downs in economic activity is to seek, and wait for, *confirmation.* There are many ways of seeking it in the materials discussed, as well as in other materials. When we know more about the economics of the short-run swings, we may be better able to recognize them as and when they occur. A last resort—and indeed the only sure way out—is to wait for confirmation in the course of events. For example, in the spring of 1954 there was a fair amount of evidence in the kinds of data presented here that the business contraction, which until then had pursued a relatively moderate course, would be short-lived. This conclusion turned out to be correct, but at the time it was certainly conceivable that it could have been wrong. By midsummer there was stronger support for this conclusion. If the opposite conclusion had been reached originally, the evidence for it would have become weaker, and it might then have been abandoned. Still later in the year, after the recovery had actually got under way, there was still some uncertainty about whether the recovery would be abortive and the contraction would resume its course. Later on, even that uncertainty was dissipated. Similar remarks might be made about the upturn in 1958.

The business forecaster operates in a continuum, and the evidence for or against the judgments he must make from time to time accumulates month after month. This must be recognized if one is to take a responsible attitude toward policy, whether private or public. Flexible and relatively inexpensive policies can be undertaken promptly, before there is a heavy preponderance of evidence in their favor, for they can be reversed if the evidence turns against the forecast. Decisions on policies that are irreversible and expensive should wait until the evidence in their favor has accumulated; if it fails to accumulate a costly mistake will have been avoided.

[20] For example, the point on the "expected" curve based on the survey taken in April 1955 covering expected changes between III 1954 and III 1955 is plotted in February 1955, the midmonth of the year referred to. The "actual" figure obtained in the *same survey* shows changes between I 1954 and I 1955, and is plotted in August 1954; the expected figure for I 1954 to I 1955 was obtained in the survey taken in September 1954.

6. The scope of a contraction shortly after it begins is correlated, though often only loosely, with the severity of the contraction. The significance of this association, however, must still be assessed from both an economic and a statistical point of view. Our studies of it have not gone sufficiently far to yield a clear answer.[21] On the statistical level, the association is relatively slight when diffusion is measured by short-run direction of change, apparently because such indexes are relatively unstable. The association is considerably closer when diffusion is measured by longer-run directions of change. For example, the 153-series index in Chart 3.7 crossed from above to below the 50 per cent line on ten occasions in the 28 years 1919–38, 1947–54. There were only seven business cycle contractions in this period; the three "extra" movements occurred in 1926–27, 1934, and 1951. Next, consider the level that the index reached three months after it crossed below the 50 per cent line. It reached a level around 30 per cent in three instances, a level of 35–45 per cent in five instances, and rose above 50 per cent in the other two instances. Now the three occasions when the index fell to 30 per cent at this stage occurred in 1921, 1929, and 1937; and these were the three most severe depressions that we have had since 1919. The five occasions when the index fell to 35–45 per cent occurred in 1923, 1926–27, 1948, and 1953; these were relatively mild or moderate contractions. And the two occasions when the index rose promptly above 50 per cent after having fallen below it occurred in 1934 and 1951, where we have not seen fit to recognize a business contraction at all.

Now there is no magic in the three-month interval. There is a modest degree of correlation at two months, and somewhat more at four, five, or six months. However—and this is a very important qualification—the level of this particular index three months after it reached 50 per cent could not be observed *at that time*, because it is centered. For example, it reached the 50 per cent line in May 1953; three months later would be August. But the figure entered in August is based on a comparison of February 1953 with February 1954. Data for February 1954 would have been required to compute the index, and it would have taken at least another month to get most of the figures. By that time, of course, the contraction was well under way.

It is difficult, therefore, to attribute much significance to this correlation from a forecasting point of view. It may be of value in situations in which the character of the decline in business activity is still uncertain after a considerable period, i.e. nine or ten months, has elapsed. This may have been the case in 1954 and 1949, perhaps even 1930, as those who recall public discussions of the matter in the early months of those

[21] For a review of the evidence, see Chapter 8. See also Henry Platt, "An Analysis of the Structure of National Income with a View to Short-Run Forecasting," Ph.D. dissertation, Columbia University, 1957.

years can testify. It was certainly not the case in 1937, when conditions deteriorated rapidly, and probably not in 1921. To sum up, the relationship serves to confirm or modify judgments reached at an early stage in a developing situation. Also, by careful use of anticipatory surveys, it may be possible to obtain the result faster. More work needs to be done both to explain the hypothesis that the scope of a business contraction in its early stages has a significant bearing on its later development, and to make practical use of this hypothesis if it stands up under examination.[22]

Depressions have at least three dimensions, not just two: depth, duration, and diffusion. This last dimension has long figured in practical discussions of the business outlook, when, for instance, references are made to a *broad* recovery, or to *widespread* depression, or to *localized* unemployment. A diffusion index simply provides a measure for it, one that can be compiled currently and studied historically. The accuracy with which most of our diffusion indexes mirror economic developments emphasizes the importance of this dimension in any analysis of the business situation. Further, our results underline the importance of policies that have a *general* effect upon the economy. By the same token, they make apparent the need to find out how general the effects of different policies are. Perhaps they provide a tool that will help us to obtain that knowledge.

Measuring the Vigor of a Business Recovery

Let us return once more to the twenty-one indicators and some additional measures constructed from them (Table 3.4). These measures illustrate how current developments during a recovery period, like that of 1954–55, can be put in a useful perspective.[23] Like the indicators themselves, the measures are a by-product of the National Bureau's study of business cycles.

The table was drawn up originally to test the common view that the strength of a recovery in its early stages depends upon the level from which it starts. An appropriate measure of that level is provided by the magnitude of the preceding contraction. In other words, it might be expected that moderate contractions would give rise to moderate recoveries, severe contractions to vigorous recoveries. Consequently the columns in the table are arranged from left to right according to the severity of the preceding contraction: the recovery beginning in November 1927, on the left-hand side, followed the mildest contraction in our business cycle chronology; the recovery beginning in March 1933, on the right-hand side, followed the greatest contraction of them all. The 1953–54

[22] For further work on the identification of severe contractions, not only by diffusion indexes but also by another approach, see Chapter 5.

[23] Unlike the other materials in this paper, Table 3.4 has been left as it was when presented in April 1955. For a fuller and more up to date presentation, covering recessions as well as revivals, see Appendix C.

TABLE 3.4

Percentage Change in Twenty-one Indicators in the First Seven Months of Revival, Arrayed by Severity of Preceding Contraction

Series	Nov. 1927 to June 1928	Aug. 1954 to Mar. 1955	Oct. 1949 to May 1950	July 1924 to Feb. 1925	June 1938 to Jan. 1939	Mar. 1933 to Oct. 1933
Leading Group						
1. Business failures, liabilities	−3.3	−2.8	+1.7	−18.1	+3.4	−40.1
2. Industrial stock prices[a]	+9.5	+22.7	+18.9	+21.9	+15.5	+59.4
3. New orders, durable goods mfrs.[b]	+6.2	+21.9	+18.5	+12.2	+34.2	+69.0
4. Constr. contracts, residential, fl. sp.	+11.9	+29.4	+27.7	+20.5	+51.4	+26.4
5. Constr. contracts, comm. & indus., fl. sp.	+40.8	+36.4	+57.3	+12.9	+32.3	+34.4
6. Av. workweek, mfg.	+1.5	+2.5	+2.3	+4.6	+7.4	−7.9
7. New incorporations, no.	+9.5	+18.6	+13.3	+21.2	−0.2	−9.0
8. Prices, basic[a]	−2.1	−1.1	+8.5	+10.4	+2.3	+34.8
Roughly Coincident Group						
9. Employment, nonagr., BLS	[c]	+1.6	+3.0	[c]	+4.4	+12.3
10. Unemployment	[c]	−15.7	−18.0	[c]	−10.4	−14.3
11. Bank debits outside NYC	+8.3	+10.9	+11.5	+11.8	+6.1	+8.1
12. Carloadings[a]	+4.6	+9.3	+25.4[d]	+8.9	+8.2	+11.8
13. Production, FRB	+6.0	+9.8	+14.6	+17.1	+25.0	+30.0
14. Prices, wholesale, exc. farm & food[a]	−0.8	+1.1	+2.2	+5.2	−1.4	+17.5
15. Corp. profits after taxes[e] (Q)	+13.0	+11.0	+4.0	+42.0	+81.0	(+)[f]
16. GNP[g] (Q)	−0.7	+3.8	+8.0	+10.0	+8.7	+11.4
Lagging Group						
17. Personal Income[b]	+0.7	+2.3	+7.0	+6.3	+4.0	+11.2
18. Retail sales	0	+5.3	+6.2	+2.9	+10.1	+13.6
19. Consumer instalment debt[b]	[c]	+5.5	+14.9	[c]	+1.2	+3.1
20. Manufacturers' inventories[b]	+0.8	−0.7	+0.9	[h]	−5.8	+5.6
21. Bank rates on business loans (Q)	+9.4	−0.6[i]	−1.1[j]	−1.4	+0.3	−9.7

NOTE: The base for each percentage change is the three-month average centered on the trough month of the business cycle. All except series (2), (8), (14), and (21) are seasonally adjusted.

[a] Change during first 8 months of revival, e.g. to Apr. 1955, July 1950, etc.

[b] Change during first 6 months of revival, e.g. to Feb. 1955, May 1950, etc.

[c] Data not available before 1929.

[d] This is considerably affected by the coal and steel strikes, Sept.–Nov. 1949, which reduced carloadings sharply, especially in October. The percentage change using the average of Sept. and Nov. as base was +17.8.

[e] Change during first quarter of revival, e.g. to IV 1954, I 1950, etc.

[f] Figure for trough (I 1933) negative; hence percentage increase cannot be computed.

[g] Change during first two quarters of revival, e.g. to I 1955, II 1950, etc.

[h] Data not available before 1927.

[i] Change from Sept. 1954 to Mar. 1955.

[j] Change from Sept. 1949 to Mar. 1950.

contraction ranks next to the mildest, followed closely by 1948–49.[24] Now it is interesting to observe that the recoveries in the FRB production index, on line 13 in the table, rank in precisely the order of the severity of the preceding contractions. In this respect, the FRB index is virtually unique, but many of the other series show a roughly similar pattern, and the hypothesis underlying the table is substantially supported. Judged on this scale, the 1954–55 recovery, after the first seven months, seemed to be more or less in line with what one would expect in view of the moderate contraction that preceded it.

Further investigation of business cycle recovery periods suggests the following tentative conclusions:

1. Recoveries in output, employment, and profits have usually been faster after severe depressions than after mild contractions.

2. Despite the faster pace after severe contractions, recovery to the previous peak level has taken longer when the preceding contraction has been severe.

3. Nearly every business expansion has carried total output, employment, and profits beyond the level reached at the preceding peak.

4. The rate of growth in output, employment, and profits has usually been largest at the initial stages of a business expansion. Thereafter, slower growth has been the rule, especially after the preceding peak level has been regained.

5. Stock prices, unlike output, employment, or profits, have advanced more rapidly after mild recessions than after severe contractions.

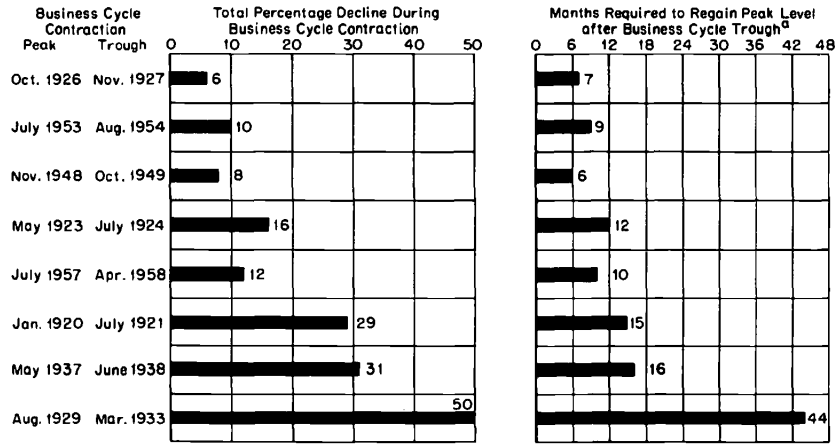
Chart 3.8 shows how long it has taken for industrial production to get back to its pre-recession level after each of seven business cycle contractions since 1920. The mildest contraction, judged not by production alone but by several indicators, is at the top, the most severe at the bottom. Recoveries took six to nine months after the mildest contractions, fifteen or sixteen months after the severe contractions of 1921 and 1938, and nearly four years after the 1929–33 catastrophe.

These intervals apply to industrial production, not necessarily to other measures of economic activity. For example, by the end of the first six months of the recovery that began in April 1958, four of the eight leading indicators (stock prices, residential building contracts, commercial and industrial building contracts, and new incorporations) had already recovered to the level on which they stood when the recession began in July 1957. Two of the eight roughly coincident indicators (bank debits and wholesale prices) and one of the five lagging indicators (personal income) had also recovered to this extent. The remaining fourteen

[24] This ranking depends in part on the particular measure used to obtain it, and is tentative and provisional. For further analysis, see Chapter 5. For a listing of cyclical amplitudes of three indexes of business activity during 25 business cycles, 1854–1958, see Table 3.6.

CHART 3.8

Months Required to Regain Previous Peak Level of Industrial Production after Business Cycle Contractions of Different Severity



[a] Interval from the business cycle trough to the first month in which the Federal Reserve Board index of industrial production equaled or exceeded its three-month average centered on the preceding business cycle peak. See Chapter 5, Table 5.9.

indicators were still below their mid-1957 levels, though most of them had recovered to some extent.[25]

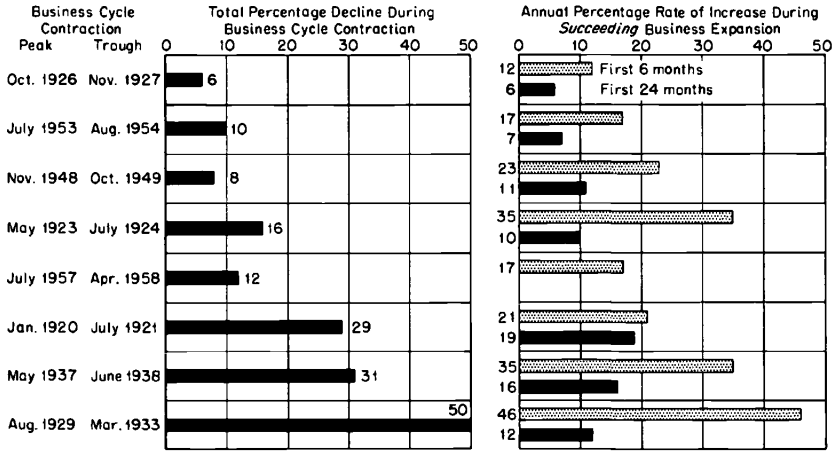
From Chart 3.9, which is arranged in the same way as Chart 3.8, we find that recoveries in industrial production proceed at a faster percentage rate after severe contractions. This is true whether one looks at the rates of growth for the first six months (shaded bars) or for the first two years following business cycle trough (white bars). Note that the percentage rates are computed on the base of the preceding peak figure, rather than in the usual fashion with the trough figure as the base (which is used in Table 3.4). This method reduces the calculated rates of recovery from severe contractions, since in such instances the preceding peak is much higher than the trough. Hence the recovery rates following severe and mild contractions become more nearly alike, although the tendency for higher rates to follow severe contractions is still perceptible.

A striking feature of Chart 3.9 is that the rate of growth during the first six months of each recovery is much greater than during the first two years, usually about twice as great. This may be partly attributable to the ease with which output can be expanded from a low level by increasing the workweek, hiring previously unemployed or partly

[25] For additional illustrations of the timing of recovery in this sense, see Chapter 5.

CHART 3.9

Rates of Increase in Industrial Production Following Business Cycle Contractions of Different Severity



Percentage declines and increases are computed on the base of the three-month average centered on the business cycle peak.

Based on Federal Reserve Board index of industrial production, adjusted for seasonal variation.

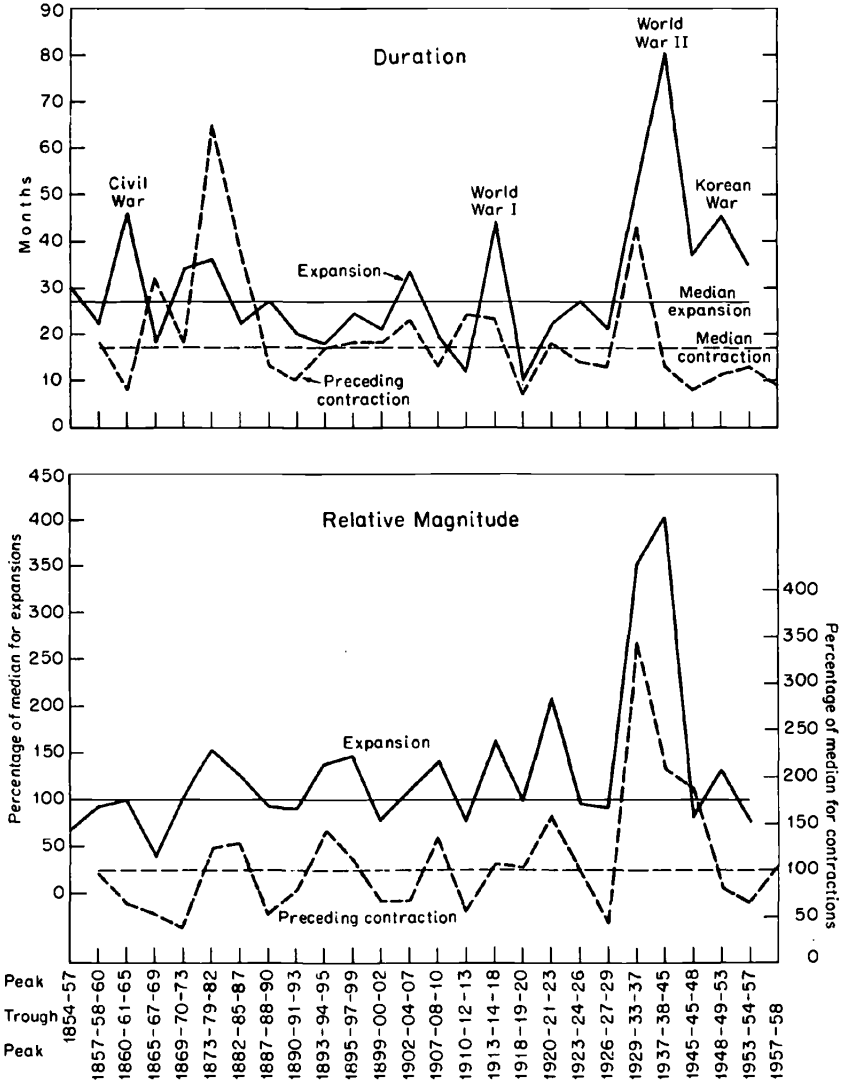
employed workers, and utilizing unused plant capacity. It may also be attributable to the lower level to which costs (labor costs per unit of output, material prices, interest rates) have usually fallen, both absolutely and relative to finished goods prices, and to the demand for output to fill up inventory pipelines. Once physical limitations begin to impose themselves, and costs begin to mount, and inventory accumulation is less pressing, the rate of growth of output tends to slacken.

It should not be inferred from Charts 3.8 and 3.9 either that business expansions stop when output has regained its pre-recession level, or that they always last two years, no more and no less. Chart 3.10 shows that the median duration of business cycle expansions since 1854 has, in fact, been about two years (twenty-seven months), but variations have been wide. Few expansions have been shorter than a year and a half, and few longer than three years, except when a major war intervened. But the range is not narrow enough to be of much help in saying how long any given expansion will last when it has just begun. The same can be said of contractions, although they have typically been shorter than expansions, especially in recent years.

Chart 3.10 also tells us that the relationship between the decline

CHART 3.10

Duration and Magnitude of Business Expansions and Contractions in the United States, 1854–1958



Duration is measured from monthly business cycle trough to peak and peak to trough (see Appendix A).

Relative magnitude is based on the average rise or fall in three indexes of business activity (see Table 3.6 in the appendix to this chapter).

during a business contraction and the rise during the succeeding expansion has been a longstanding one—witness the roughly parallel movements of the two lines at the bottom of the chart.

History teaches that every business cycle can be different, can develop unprecedented or at least unusual features. It behooves us, therefore, to be in a position continuously to re-examine and reappraise the situation as it develops. We should be prepared not only for the surprises that are unquestionably in store, but also to distinguish the surprises from the developments that are more or less to be expected. The method illustrated in Table 3.4 can be used to appraise a business cycle recovery month by month as it develops; to measure its vigor, scope, and unusual features; to derive some rough notions of its probable course and duration; and to check the reasonableness of forecasts constructed by other means, always remembering that typical rates of recovery and patterns of change vary from one measure of economic activity to another. The figures can be graphed and kept up to date on the plan used in Chart 3.11, which compares the 1958–59 recovery with other business recoveries since 1920.

The chart is constructed by converting each indicator, starting at the business cycle trough month (or quarter), to a percentage of its level (three-month average) at the preceding business cycle peak. This preceding peak level is not necessarily the highest point reached by the indicator itself, since some indicators will have begun to decline before the business cycle peak and others afterwards. Similarly, the business cycle trough is not necessarily the lowest level reached by the particular indicator. The initial ratio for each series and for each recovery period simply measures the level of the indicator when the recovery started relative to its level when the contraction began. These positions are plotted in the first column of points at the left of the chart. The points are numbered from (1) to (8) in order of the severity of the preceding contraction, starting with the mildest (see Chapter 5). Except for the 1958–59 recovery (5), the points are plotted only every six months to simplify the chart; the intervening points can be filled in if needed from the tables given in Appendix C. Like-numbered points can be connected by straight lines to show rates of increase during each recovery.

The chart makes clear once more that the severity of the business contraction is one of the principal factors affecting both the length of time required to regain the pre-recession level of output, employment, or profits, and the position attained relative to this level at any given time during the recovery period. The tendency for slower growth after an initial upsurge is also shown. Forecasts based on the growth rates that prevailed during, say, the first two years of recovery would usually understate the increases achieved during the first six or twelve months. Correspondingly, an extrapolation of initial rates of increase would usually

overshoot the mark actually attained by the end of two years. This type of retardation has been sharper in the workweek than in employment, sharper in industrial production than in gross national product, sharper in profits than in production, and barely perceptible in stock prices.

The stock price chart (panel 7) has some interesting features. The left-hand column of points shows that in a recession the market has tended to react more or less in line with other indications of the recession's severity, since the points are in rough numerical order. However, in each of the four milder recessions (nos. 1, 2, 3, and 4), by the time the low in business activity had been reached, the stock price index had more than recovered the level on which it stood when the recession began. Further, the market tended to react with confidence during the recovery after a mild recession and with much less confidence after a severe one. The largest increases in stock prices over their pre-recession levels have occurred after mild recessions.

Although an analysis of the type illustrated in these charts provides a useful perspective and a convenient way to measure the progress of recovery, it is nevertheless only a beginning. Economic change cannot be understood in terms of global figures such as industrial production, total employment, or aggregate profits alone. Moreover, one of the implications of the charts, that the character of a recovery depends on the kind of recession that preceded it, is only a partial truth. Developments during the recovery itself will certainly influence its course and progress, and so will developments during the expansion that preceded the recession.

CHART 3.11
Business Recovery Patterns

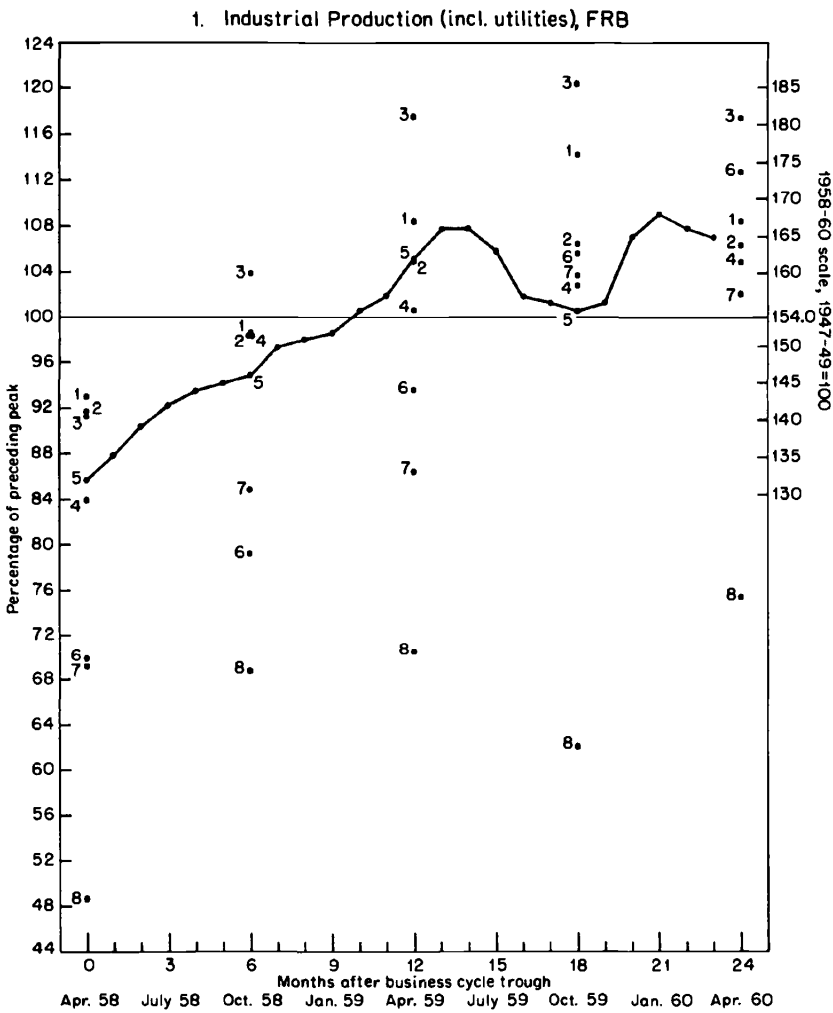


CHART 3.11 (continued)

2. Gross National Product, in current prices

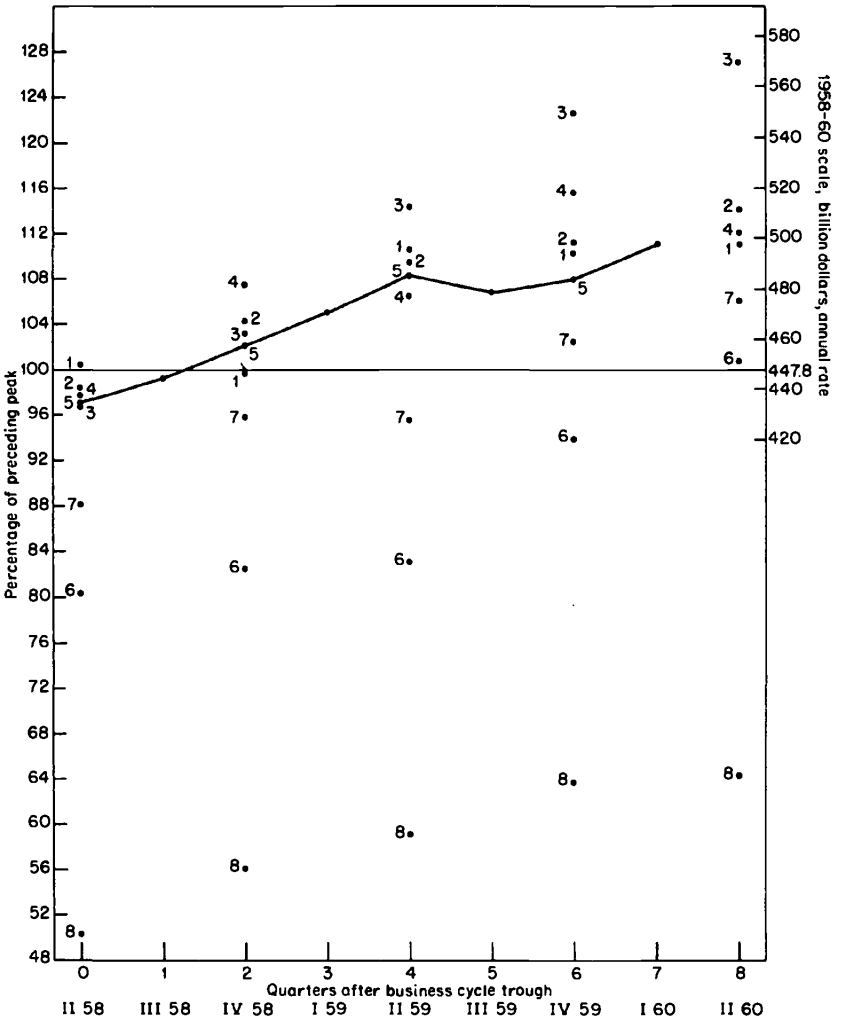


CHART 3.11 (continued)

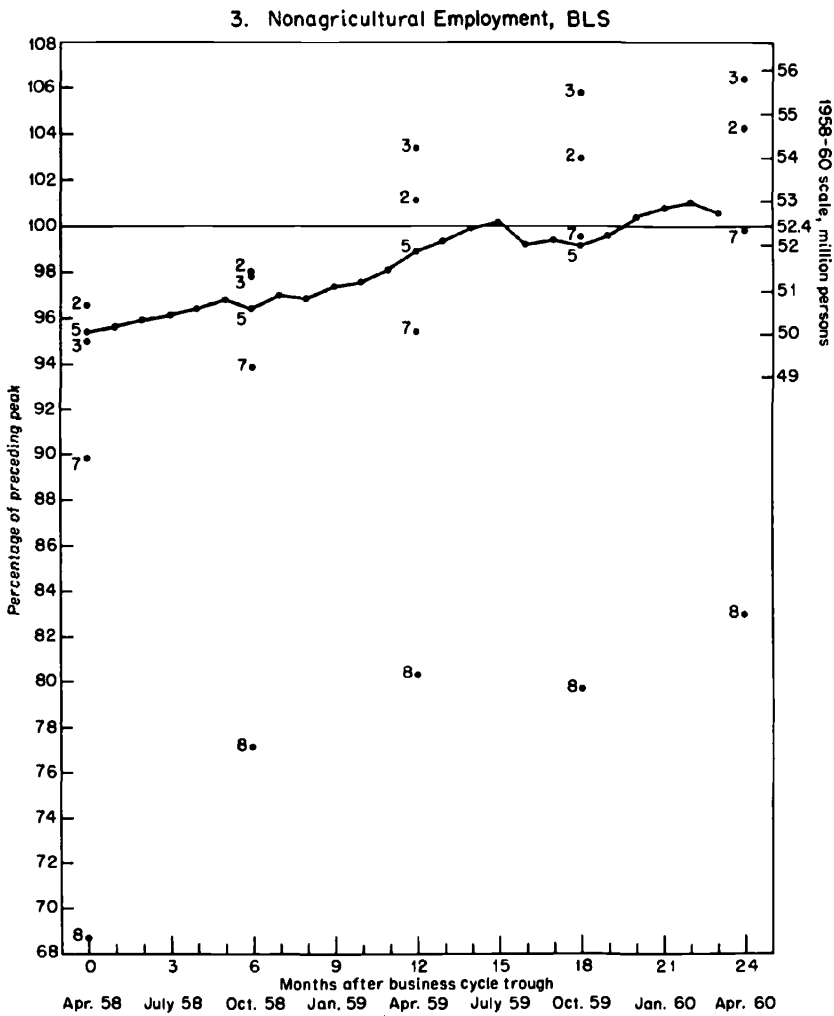
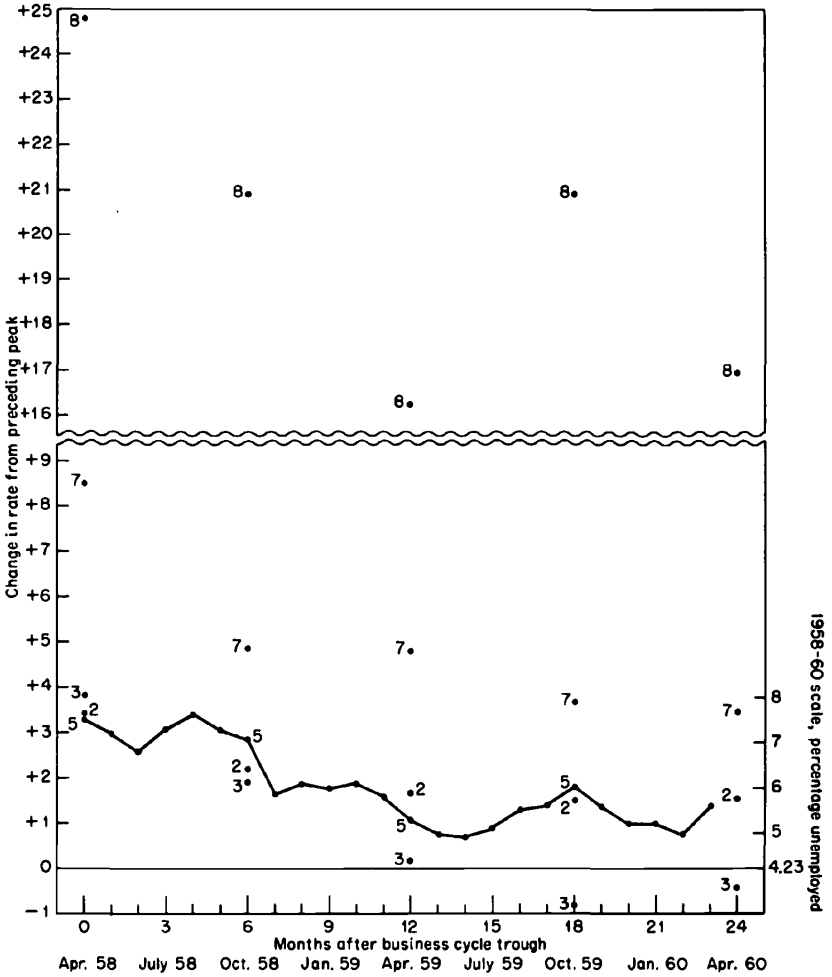


CHART 3.11 (continued)

4. Unemployment Rate



Data not available for periods (1), (4), and (6).

CHART 3.11 (continued)

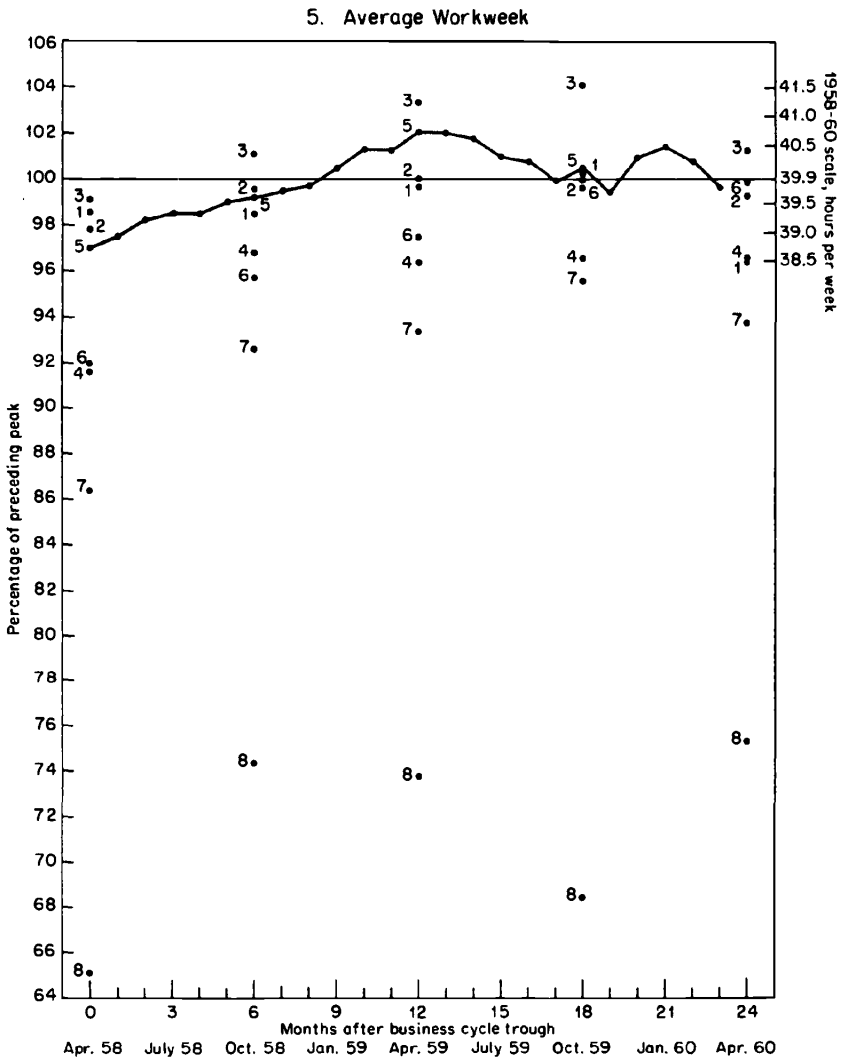


CHART 3.11 (continued)

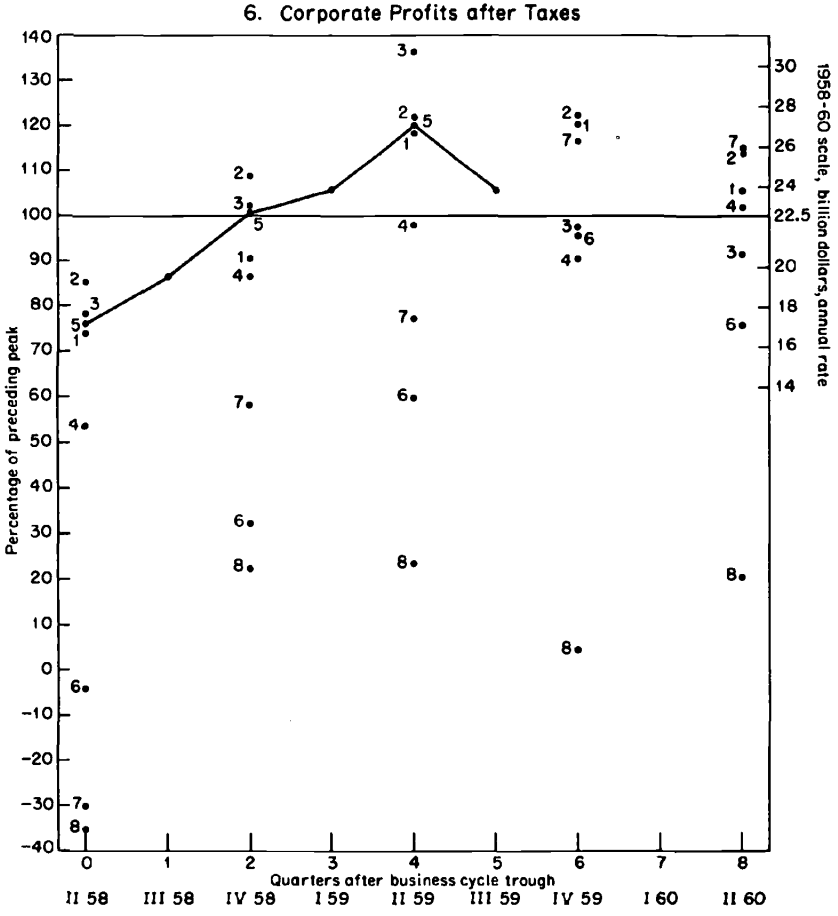
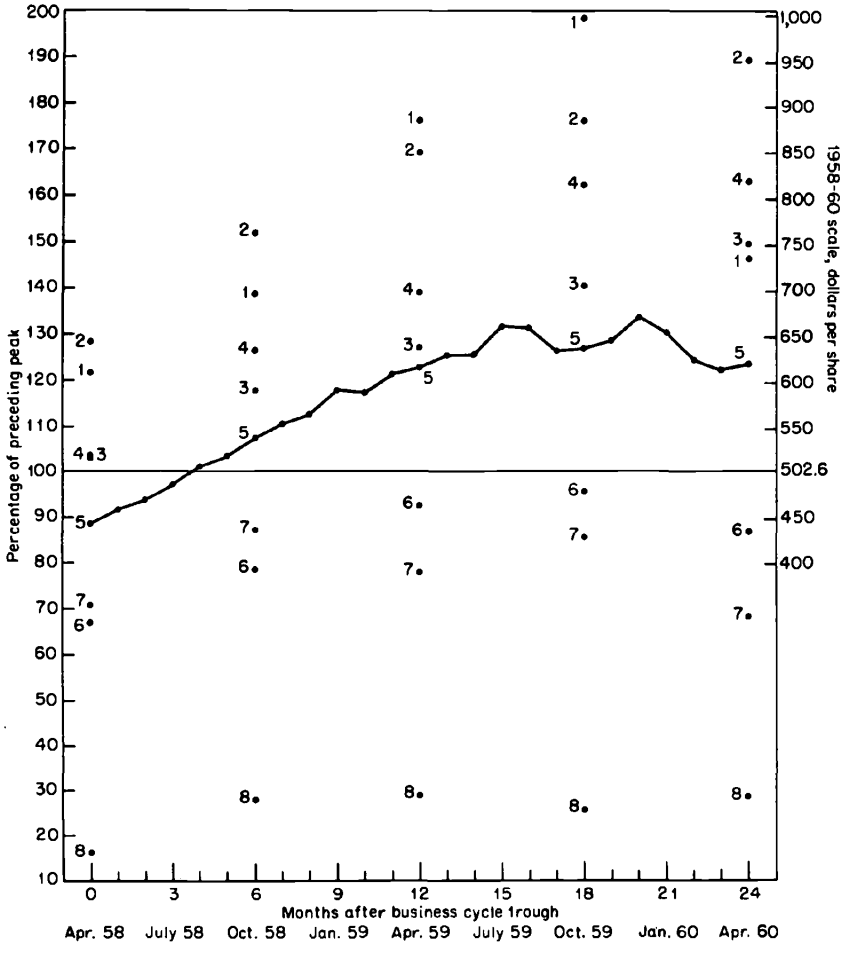


CHART 3.11 (concluded)

7. Industrial Stock Prices, Dow-Jones



Numerals identify business cycle recovery periods, arrayed in order of the severity of the preceding contraction (mildest first). The monthly and quarterly trough dates with which the recoveries begin are: (1) Nov. 1927, IV; (2) Aug. 1954, III; (3) Oct. 1949, IV; (4) July 1924, III; (5) April 1958, II; (6) July 1921, III; (7) June 1938, II; (8) March 1933, I. For the preceding peak dates, see Appendix A.

SOURCE: Appendix C.

Appendix

TABLE 3.5

Prewar and Postwar Timing of Twenty-one Indicators, Peaks and Troughs Separately

	8 Leading Indicators (1)	8 Roughly Coincident Indicators (2)	5 Lagging Indicators (3)	21 Indicators (4)	8 Leading Indicators (5)	8 Roughly Coincident Indicators (6)	5 Lagging Indicators (7)	21 Indicators (8)
	PREWAR BUSINESS CYCLE PEAKS (TO 1937)[a]				THREE POSTWAR BUSINESS CYCLE PEAKS (1948–57)			
1. Total business cycle turns covered[b]	86	68	19	173	24	24	15	63
2. Total specific cycle turns covered[c]	85	59	18	162	22	23	14	59
3. Business cycle turns not matched	10	11	2	23	6	3	2	11
4. Specific cycle turns not matched	9	2	1	12	4	2	1	7
	Timing Comparisons							
5. Total timing comparisons:	76	57	17	150	18	21	13	52
6. Leads, 4 months & over	40	9	2	51	17	8		25
7. Leads, 1–3 months	20	7	0	27		6	1	7
8. Exact coincidences	2	12	2	16	1	4	2	7
9. Rough coincidences[d]	31	38	6	75	1	13	7	21
10. Lags, 1–3 months	9	19	4	32		3	4	7
11. Lags, 4 months & over	5	10	9	24			6	6
12. Consistent timing comparisons[e]	61	38	14	113	17.5	13	11	41.5
13. Inconsistent timing comparisons	15	19	3	37	0.5	8	2	10.5
	Average Lead (−) or Lag (+) (in months)							
14. Consistent timing comparisons	−8.0	+0.7	+4.9		−18.8	−0.6	+3.8	
15. Inconsistent timing comparisons	+3.9	−9.9[f] +7.7[g]	−2.8		0	−14.0[f] [g]	−1.0	
16. All timing comparisons	−5.6	+0.2	+3.6	−2.4	−18.3	−5.7	+3.0	−7.9

TABLE 3.5 (continued)

	8 Leading Indicators (1)	8 Roughly Coincident Indicators (2)	5 Lagging Indicators (3)	21 Indicators (4)	8 Leading Indicators (5)	8 Roughly Coincident Indicators (6)	5 Lagging Indicators (7)	21 Indicators (8)
	PREWAR BUSINESS CYCLE TROUGHS (TO 1938)[a]				THREE POSTWAR BUSINESS CYCLE TROUGHS (1949–58)			
1. Total business cycle turns covered[b]	90	70	22	182	24	24	15	63
2. Total specific cycle turns covered[c]	91	63	20	174	24	23	14	61
3. Business cycle turns not matched	7	8	3	18	4	3	2	9
4. Specific cycle turns not matched	8	1	1	10	4	2	1	7
	Timing Comparisons							
5. Total timing comparisons:	83	62	19	164	20	21	13	54
6. Leads, 4 months & over	50	17	2	69	13	3	2	18
7. Leads, 1–3 months	14	17	4	35	4	6	3	14
8. Exact coincidences	8	17	2	27	2	8	1	10
9. Rough coincidences[d]	26	43	11	80	7	17	7	31
10. Lags, 1–3 months	4	9	5	18	1	3	3	7
11. Lags, 4 months & over	7	2	6	15		1	4	5
12. Consistent timing comparisons[e]	68	43	12	123	18	17	7.5	43
13. Inconsistent timing comparisons	15	19	7	41	2	4	5.5	11
	Average Lead (−) or Lag (+) (in months)							
14. Consistent timing comparisons	−6.4	−0.3	+7.5		−4.8	−0.4	+4.1	
15. Inconsistent timing comparisons	+5.5	−8.4[f] +5.5[g]	−3.6		+1.0	−6.3[f] +4.0[g]	−3.0	
16. All timing comparisons	−4.3	−2.4	+3.4	−2.7	−4.2	−1.0	+1.1	−1.7

NOTE: The business cycle peak of February 1945 and trough of October 1945 and specific cycle turns during 1939–45 are omitted.

[a] Includes all specific and business cycle turns covered by each indicator or its historical equivalent through 1937 (peaks) or 1938 (troughs). See Appendix B.

[b] Sum of lines 3 and 5.

[c] Sum of lines 4 and 5.

[d] Includes leads of 1–3 months (line 7), exact coincidences (line 8), and lags of 1–3 months (line 10).

[e] For leading indicators, number of leads plus one-half the exact coincidences. For roughly coincident indicators, number of rough coincidences. For lagging indicator s number of lags plus one-half the exact coincidences.

[f] Leads longer than 3 months.

[g] Lags longer than 3 months.

TABLE 3.6

Average Amplitude of Rise and Fall in Three Indexes of Business Activity During Twenty-five Business Cycles, 1854–1958

EXPANSIONS				CONTRACTIONS			
Business Cycle		Average Percentage Rise	Index (per cent of median rise)	*Business Cycle*		Average Percentage Fall[a]	Index (per cent of median fall)
Trough	Peak			Peak	Trough		
Dec. 1854	June 1857	12.3	68	June 1857	Dec. 1858	21.0	96
Dec. 1858	Oct. 1860	16.8	93	Oct. 1860	June 1861	14.1	65
June 1861	Apr. 1865	18.1	100	Apr. 1865	Dec. 1867	11.4	52
Dec. 1867	June 1869	6.9	38	June 1869	Dec. 1870	7.9	36
Dec. 1870	Oct. 1873	18.4	102	Oct. 1873	Mar. 1879	26.9	123
Mar. 1879	Mar. 1882	27.6	152	Mar. 1882	May 1885	27.9	128
May 1885	Mar. 1887	22.7	125	Mar. 1887	Apr. 1888	11.2	51
Apr. 1888	July 1890	16.6	92	July 1890	May 1891	17.0	78
May 1891	Jan. 1893	16.3	90	Jan. 1893	June 1894	30.7	141
June 1894	Dec. 1895	25.3	140	Dec. 1895	June 1897	24.3	111
June 1897	June 1899	26.6	147	June 1899	Dec. 1900	14.4	66
Dec. 1900	Sep. 1902	14.2	78	Sep. 1902	Aug. 1904	14.4	66
Aug. 1904	May 1907	20.2	112	May 1907	June 1908	29.5	135
June 1908	Jan. 1910	25.6	141	Jan. 1910	Jan. 1912	12.0	55
Jan. 1912	Jan. 1913	13.6	75	Jan. 1913	Dec. 1914	23.2	106
Dec. 1914	Aug. 1918	29.8	165	Aug. 1918	Mar. 1919	22.0	101
Mar. 1919	Jan. 1920	17.9	99	Jan. 1920	July 1921	34.7	159
July 1921	May 1923	38.0	210	May 1923	July 1924	21.8	100
July 1924	Oct. 1926	17.8	98	Oct. 1926	Nov. 1927	9.3	43
Nov. 1927	Aug. 1929	16.7	92	Aug. 1929	Mar. 1933	75.1	344
Mar. 1933	May 1937	63.7	352	May 1937	June 1938	45.4	208
June 1938	Feb. 1945	72.7	402	Feb. 1945	Oct. 1945	41.0	188
Oct. 1945	Nov. 1948	14.7	81	Nov. 1948	Oct. 1949	17.5	80
Oct. 1949	July 1953	23.9	132	July 1953	Aug. 1954	14.3	66
Aug. 1954	July 1957	13.9	77	July 1957	Apr. 1958	22.7	104
Median rise, 1854–1957		18.1	100	Median fall, 1857–1958		21.8	100

Footnotes to Table 3.6

NOTE: Since 1879, the figures are averages based on three trend-adjusted indexes: American Telephone and Telegraph Company index of business activity, index of industrial production and trade constructed by Warren M. Persons and continued by Barron's Publishing Company, and Ayres' index of business activity compiled by the Cleveland Trust Company. Before 1879, the entries are for Ayres' index alone. The rise from the specific cycle trough to specific cycle peak in each index is taken as a percentage of the average level of the index during the full specific cycle (trough to trough), and the fall from specific peak to specific trough is taken as a percentage of the same base. The amplitudes of the three indexes were considered sufficiently alike to warrant averaging: for the period 1879–1949 the average rise during specific cycle expansions was 27.3 (AT&T), 26.8 (Persons), and 25.9 (Ayres); the corresponding averages for contractions were 26.9, 25.8, and 25.8. This table is an extension of Table 156 in Burns and Mitchell, *Measuring Business Cycles*, p. 403.

The indexes of business activity from which the amplitude measures are derived are adjusted for long-term trend. For most purposes amplitude measures based on unadjusted data would be preferable, but only one of the three indexes (AT&T) is available in unadjusted form, and this only since 1900. The principal effect of the use of trend-adjusted indexes is to increase the amplitude of contractions relative to that of expansions. Hence the percentage declines in the table are roughly the same size as the percentage rises, whereas in unadjusted data the declines would generally be smaller than the rises.

Since the percentage rise in each index is computed on the base of the average level of the index during a specific cycle, it is smaller than if it had been computed in the usual way with the initial (trough) figure as base. Similarly, the percentage fall is larger than if it had been computed with the peak as base. However, as computed, the percentage rise is comparable with the succeeding percentage fall, since both are computed on the same base.

The amplitude measures pertain to the total rise or fall in the indexes, not to the rate of change per month or year. For some purposes the rate may be the more significant figure. Such rates can be approximated by dividing the total change by the duration of the business cycle expansion or contraction, but the approximation is rough because the total changes are based on specific cycles.

The amplitude measures depend importantly on the cycle chronology. If some of the milder contractions had been omitted, for example, the amplitude of the expansions which they interrupt would be much greater.

The amplitude figures shown here have serious limitations as measures of the severity of business cycles, besides those just mentioned. The composition of each of the indexes of business activity has changed from time to time, and these changes may have affected their amplitude. Other measures of aggregate economic activity may be more precisely defined conceptually and more precisely estimated statistically, especially in recent cycles. Some such alternative measures, covering contractions since 1920, are provided in Chapter 5, Tables 5.2 and 5.14.

TABLE 3.7

Convenient Sources of Current Data for Twenty-six Indicators (1960 List)

Indicator	*Survey of Current Business* Monthly	*Survey of Current Business* Weekly Supp.	*Federal Reserve Bulletin*, Monthly	*Economic Indicators*, Monthly	Press Release or Other Primary Source[a]
Leading Group					
1.0 Average workweek, mfg.	U	U	U	U	BLS, *Monthly Report on the Labor Force, Employment, Unemployment, Hours and Earnings* (S)
2.0 Gross accession rate, mfg.	U	U	n.a.	n.a.	BLS, *Factory Labor Turnover*
3.0 Layoff rate, mfg.	U	U	n.a.	n.a.	Same as 2.0
4.0 New orders, durable goods mfg. industries, value	S	S	n.a.	n.a.	OBE, *Business News Reports, Manufacturers' Sales, Orders, and Inventories*
5.0 Housing starts, no. of new dwelling units	S	S	S	S	Census, *Housing Starts, Construction Reports*, No. C 20.
6.0 Commercial & industrial building contracts, floor space	n.a.	n.a.	n.a.	n.a.	F. W. Dodge Corporation, *Construction Contracts, United States Summary* (U)
7.0 Net change in no. of operating businesses (Q)	S	n.a.	n.a.	n.a.	OBE, *Survey of Current Business*
8.0 Business failures, liabilities, indus. & comm.	U	U	n.a.	n.a.	Dun and Bradstreet, Inc., Business Economics Department, *Business Trend News, Monthly Failures.*
9.0 Corporate profits after taxes (Q)	S	S	S	S	OBE, *Business News Reports, National Income and Corporate Profits*[b]
10.0 Common stock price index, industrials, rails, and utilities	U*	U*	U*	n.a.	Standard and Poor's Corporation, *Trade and Securities Statistics, Current Statistics.*
11.0 Change in business inventories (Q)	S	S	S	S	OBE, *Business News Reports, Gross National Product*[b]
12.0 Industrial raw materials price index	n.a.	n.a.	n.a.	n.a.	BLS, *Daily Indexes and Spot Market Prices* (U*)
Roughly Coincident Group					
13.0 Employment in nonagric. establishments	S	S	S	S	See 1.0
14.0 Unemployment rate	S	n.a.	S	S	See 1.0

15.0 Industrial production index	S	S	S	S	FRB, *Business Indexes* (No. G.12.3)
16.0 GNP, in current dollars (Q)	S	S	S	S	See 11.0[b]
17.0 GNP, in constant (1954) dollars (Q)	S	n.a.	n.a.	S[c]	OBE, *Survey of Current Business*
18.0 Bank debits outside NYC	U	U	S	n.a.	FRB, *Bank Debits* (No. G.6)
19.0 Personal Income	S	S	S	S	OBE, *Business News Reports, Personal Income*
20.0 Sales by retail stores	S	S	n.a.	S	Census, *Advance Retail Sales Report*
21.0 Wholesale price index, excl. farm products & foods	U	U	U	U	BLS, *Wholesale Price Index* (weekly release)
Lagging Group					
22.0 Plant & equipment expenditures, total (Q)	S	n.a.	[d]	S	OBE, *Business News Reports, Plant and Equipment Survey*
23.0 Wage & salary cost per unit of output, mfg.	n.a.	n.a.	n.a.	n.a.	See 15.0 and 19.0 for sources of component series; NBER divides manufacturing wage and salary disbursements by index of manufacturing production (both components seasonally adjusted)
24.0 Manufacturers' inventories, book value (end of month)	S	S	n.a.	S	See 4.0
25.0 Consumer instalment debt (end of month)	U	U	U	U	FRB, *Consumer Credit, Short- and Intermediate-Term* (No. G.19)
26.0 Bank interest rates on business loans (last month of quarter)	U*	n.a.	U*	n.a.	FRB, *Federal Reserve Bulletin*

S = available in seasonally adjusted form in the source.

U = available only in seasonally unadjusted form; seasonal adjustment by NBER (see Volume II).

U* = available only in seasonally unadjusted form; seasonal adjustment not necessary.

n. a. = not available.

[a]The sources cited are those in which the current figures are first released, sometimes in rounded or preliminary form. Note, however, that these sources do not ordinarily provide revised figures for earlier dates, which the monthly periodicals listed at the left do.

[b] Advance figures are published in *Economic Indicators*.

[c] *Economic Indicators* furnishes series in 1958 dollars.

[d] Shown seasonally unadjusted only.

BLS = Bureau of Labor Statistics

FRB = Federal Reserve Board

OBE = Office of Business Economics

TABLE 3.8

Measures of Erratic Movements and Smoothing Periods, Twenty-six Indicators (1960 List)

Indicator	Av. Dur. of Run, Seas. Adj. Data, 1947–58[a] (1)	*Av. Per Month Percentage Change in*		Ratio, *I/C* (4)	Months for Cyclical Dominance, *MCD* (5)	*I/C* for *MCD* Span (6)	*Av. Dur. of Run*	
		Irregular Component, *I* (2)	Trend-Cycle Component, *C* (3)				*MCD* Moving Average (7)	Seas. Adj. Data, *CI* (8)
Leading Group								
1.0 Average workweek, mfg., BLS	3.0	0.3	0.2	1.5	2	.74	4.6	2.9
2.0 Gross accession rate, mfg., BLS	2.3	5.0	2.2	2.3	3	.78	5.8	2.4
3.0 Layoff rate, mfg., BLS	2.4	11.0	5.6	2.0	3	.65	6.4	2.5
4.0 New orders, durable goods mfg. indus., value, Census-OBE	2.0	4.6	2.0	2.3	3	.75	3.6	1.9
5.0 Housing starts, no. of new dwelling units, Census	2.5	2.3	1.4	1.6	3	.65	5.6	2.3
6.0 Commercial & indus. building contracts, fl. sp., Dodge	1.6	12.8	2.8	4.5	5	.84	3.3	1.6
7.0 Net change in no. of operating businesses, OBE (Q)	17.6	12.0	6.9	1.7	n.a.	n.a.	n.a.	n.a.
8.0 Business failures, liabilities, indus. & comm., Dun and Bradstreet	1.5	15.1	3.1	4.9	6	.88	2.9	1.6
9.0 Corporate profits after taxes, OBE (Q)	7.8	3.2	2.2	1.4	n.a.	n.a.	n.a.	n.a.
10.0 Common stock price index, industrials, rails, and utilities, Standard and Poor's	2.5	1.5	1.4	1.0	2	.60	4.6	2.4
11.0 Change in business inventories, OBE (Q)	5.9	7.1	3.4	2.1	n.a.	n.a.	n.a.	n.a.
12.0 Industrial raw materials spot market price index, BLS	2.5	1.4	1.6	0.9	1	.87	3.2	3.2
Roughly Coincident Group								
13.0 Employment in nonagric. establish., BLS	3.2	0.2	0.3	0.7	1	.69	3.6	3.6

14.0 Unemployment rate, BLS	2.3	3.7	2.9	1.3	2	.73	3.1	2.4
15.0 Total indus. production index (incl. utilities), FRB	4.6	0.7	0.7	1.0	2	.51	3.6	3.6
16.0 GNP, in current dollars, OBE (Q)	15.7	0.5	0.6	0.9	n.a.	n.a.	n.a.	n.a.
17.0 GNP, in constant dollars, OBE (Q)	9.4	0.4	0.4	1.1	n.a.	n.a.	n.a.	n.a.
18.0 Bank debits outside NYC, FRB	2.0	3.0	0.8	4.0	3	.77	3.0	1.4
19.0 Personal income, OBE	3.2	0.5	0.6	0.9	1	.93	2.7	2.7
20.0 Sales by retail stores, Census	1.9	1.7	0.6	3.0	3	.97	3.3	1.7
21.0 Wholesale price index, excl. farm products and foods, BLS	6.8	0.2	0.4	0.4	1	.41	8.3	8.3
Lagging Group								
22.0 Plant & equipment expenditures, total, OBE–SEC (Q)	12.8	1.3	1.1	1.2	n.a.	n.a.	n.a.	n.a.
23.0 Wage and salary cost per unit of output, mfg., OBE and FRB	2.8	0.5	0.4	1.1	2	.64	4.2	2.5
24.0 Manufacturers' inventories, book value, Census-OBE	8.9	0.2	0.9	0.3	1	.28	11.3	11.3
25.0 Consumer instalment debt, FRB	11.0	0.3	1.6	0.2	1	.19	13.8	13.8
26.0 Bank interest rates on business loans, FRB (Q)	9.4	0.9	0.8	1.1	n.a.	n.a.	n.a.	n.a.

NOTE: The periods covered in cols. 2–8 vary from series to series, but start in 1946–48 (except series 5.0, which starts in 1951) and end in 1957–59. The seasonally adjusted data used in cols. 2–8, derived from the electronic computer program described in Chapter 17, differ in some instances from those used in col. 1 (and shown in Volume II). In particular, seasonal factors are eliminated by the program, regardless of whether they are believed to exist in the series (cf. note *a*) or if they have already been eliminated by the compilers. In these cases, although the seasonal factors have relatively small amplitudes, their elimination smooths the data, reducing *I* (col. 2) and *I/C* (col. 4). Except for this and the differences in periods covered, cols. 1 and 8 would be identical. The number of months for cyclical dominance (*MCD*, col. 5) represents the span of moving average required to reduce *I/C* to less than 1.00 (see col. 6). On the assumption that *I* is reduced proportionately as the span is increased while *C* remains constant (both computed on a per month basis), *MCD* can be closely estimated from *I/C* (col. 4), by the formula $MCD = I/C + 0.5$. For further explanation of terms, see Chapter 17. The moving average periods in col. 5 are usually shorter by one or two (occasionally three) months than those selected according to the criterion developed in Chapter 20 (cf. Table 3.3).

[a] The "incomplete" runs at the beginning and end of the data are included in the averages. Seasonally adjusted data are used except where seasonal is not believed to exist, as in series 10.0, 12.0, and 26.0.