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Appendix A

Technical Notes on Amplitude-Adjusted General Indexes, Adjusted Rates of Change, and Diffusion Indexes

Percentage rates of change computed in the conventional way have an asymmetrical range of positive and negative fluctuations and differ widely for different economic series. Techniques are available for modifying the conventional percentage change formula and standardizing the monthly rates of change of different series, so as to bring about a symmetrical range of fluctuations and make it possible to average series which, before adjustment, have widely different amplitudes. Moreover, the current movements of different series are easier to compare after standardization than before.

To accomplish these objectives, percentage changes are first calculated by a modified formula. The conventional formula for calculating the percentage change over a given time interval is $100(B—A)/A$, where A is the value for the first period (e.g., month) and B the value for the last period in the interval. This formula allows the percentage change, assuming A and B cannot be negative, to vary between —100 and + infinity. The modified formula is $200(B—A)/(B+A)$. In this formula the sum of A and B is used as the denominator in order to keep positive and negative percentage changes symmetrical, and the factor 200 is used in the numerator to bring the modified values to the approximate level of the conventional values. The percentage changes resulting from this modified formula, assuming A and B cannot be negative, can vary between —200 and +200. Consider, for example, a series for which the consecutive values are 40, 80, 40, 80, 40, 80, and 40. Although there is no upward trend in such a series, the conventional percentage change formula will yield an average rise of 25 per cent (since an equal number

NOTE: I am indebted to Harry Rosenblatt of the Bureau of the Census for clarifying the interpretation of the general indexes and adjusted rates of change.

of percentages of +100 and —50 would be averaged). The modified formula will yield a series of percentage rises equal to the series of percentage declines (+66⅔ and —66⅔), and an average change of zero.[1]

The modified month-to-month rates of change are then standardized. Some economic time series typically have greater period-to-period percentage changes than others. Averages of percentage changes for series with varying amplitudes would be dominated by the more volatile series. For instance, the stock price and industrial materials price series undergo relatively small changes from month to month (without regard to sign, they average 3.0 and 2.2 per cent respectively, for the seasonally adjusted series). On the other hand, the month-to-month percentage changes in liabilities of business failures are typically very large (the average is 17.3 per cent). If percentage change series based on these three economic indicators were averaged, the month-to-month movements in the resulting series would be dominated by the movements in the failures series. The method of standardizing the month-to-month percentage changes employed here is as follows: for each series, consecutive month-to-month percentage changes are calculated and averaged over the whole period of the series without regard to sign; each month-to-month percentage change is divided by the average percentage change (without regard to sign) for that series.[2] The result is a new group of standardized series for which a meaningful average can be computed, because each series has the same average (without regard to sign) month-to-month amplitude, namely *one*. Modified and standardized rates of change are referred to here as "adjusted rates of change." The adjusted rates of change are also converted to amplitude-adjusted indexes. To construct such an index, the value for the first month for which a series is available is set at 100, and the values for the subsequent months are obtained by applying the formula $A(200+r)/(200-r)$, where A is the value for the month preceding the desired month and r is the adjusted rate of change between the two months.

The mechanics of constructing the general indexes involve first standardizing each component series by dividing the rates of change by their average *without* regard to sign. The standardized component series are then averaged *with* regard to sign. Since signs are taken into

[1] Symmetrical relative changes can, of course, also be obtained by converting the series to logarithms and taking their first differences. For a method of standardization using this approach, see "An Amplitude Adjustment for the Leading Indicators," by Geoffrey H. Moore, *Business Cycle Indicators*, Volume I, Chapter 19.

[2] Other methods of standarizing series might give equally good or even better results; for example, the seasonally adjusted observations for each series might be expressed in units of their standard deviation, or in units of their average rate of cyclical change per month.

account in calculating the group averages, their average month-to-month changes are not equal to one. To make them equal to one, the group averages are divided by their average month-to-month changes without regard to sign. The adjusted rates of change and the general indexes thus calculated for the period 1948-60 are given in Appendix C. The indexes and adjusted rates of change shown in the charts in this appendix and in Chart 3 of the text differ somewhat because the component series differ and different periods are covered.

Adjusted Rates of Change and Diffusion Indexes

Although diffusion indexes and rates of change focus on different objectives—a diffusion index focuses on the scope of a business fluctuation and a rate of change upon its magnitude—there is abundant evidence in the literature that conventional rates of change and diffusion indexes are closely correlated. Like adjusted rates of change, diffusion indexes have a symmetrical range of fluctuations and comparable month-to-month changes for different series (i.e., a rise is counted as +1 and a fall as zero). Consequently, series based upon adjusted rates of change might be expected to be more like diffusion indexes than series based upon conventional rates of change.[3] Tests indicate that fluctuations in adjusted rates of change do in fact approximate more closely those of diffusion indexes than do conventional rates of change.

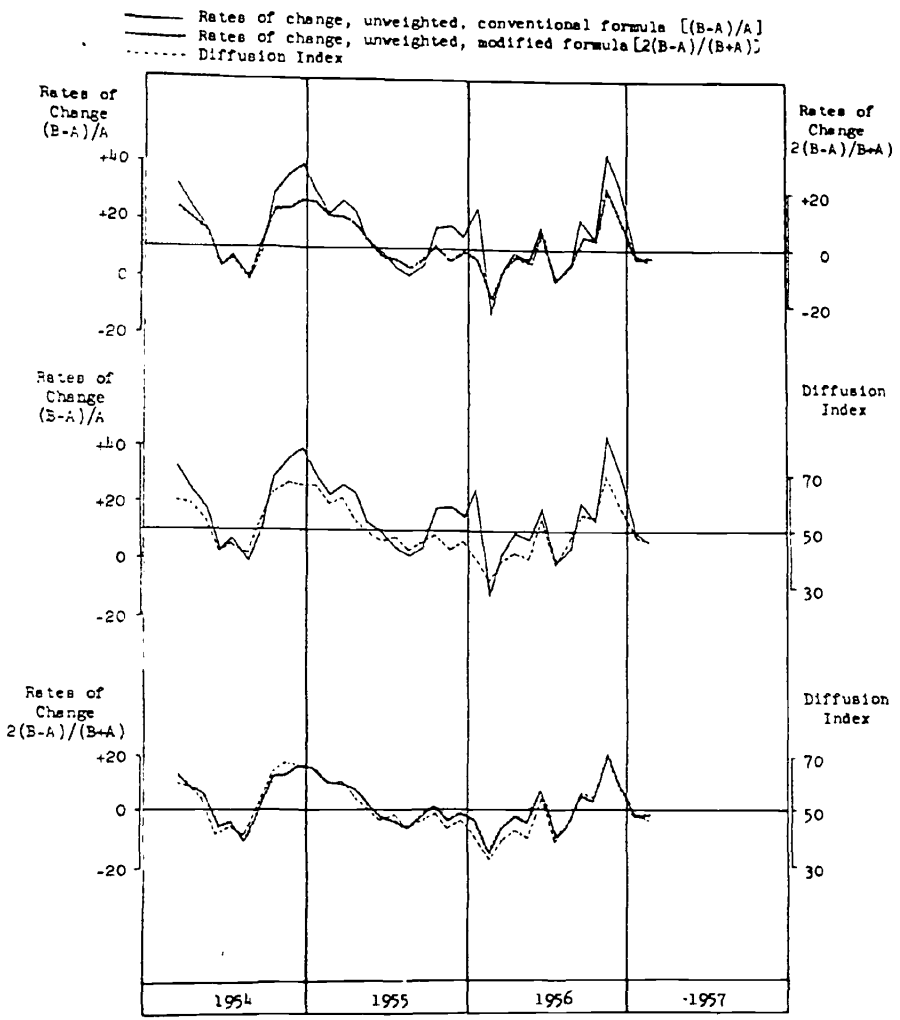
Empirical Comparisons

Conventional and modified rate of change series and a diffusion index for the sales of 285 individual automobile dealers from February 1954 to February 1957 are compared in Chart A-1. The upper pair of curves compare the conventional and modified rates of change. The directions of change are quite similar, but the amplitude of the conventional rate series in the positive direction is greater than that of the modified rate series (note that the scales in the chart are offset, so that +10 in the conventional rate corresponds to zero in the modified rate). This difference is, of course, due to the limitation on the upper range of fluctuations in the modified formula. A diffusion index is compared with the conventional rate of change series in the second pair of curves; again the movements of the two are quite similar, but the conventional rate of change series has the greater amplitude. Here again the difference is due to the limitation on the upper range of fluctuations in the diffusion index. The third pair of curves includes the diffusion index

[3] An important reason for modifying rates of change, in addition to standardizing them, is to obtain a measure which will combine the advantages of conventional rates of change and diffusion indexes.

CHART A-1

Comparisons of Rates of Change and a Diffusion Index, Auto Dealer Sales, 1954-57



and the modified rate of change series. It is striking how dissimilarities between rates of change and diffusion indexes are reduced after the modifications. The month-to-month configurations in the two series are almost identical.

The rates of change in this case are unweighted means; that is, each dealer regardless of size is given a weight of one in computing the averages. The diffusion index and both rate of change series are computed over four-month spans and plotted in the third month of each span.

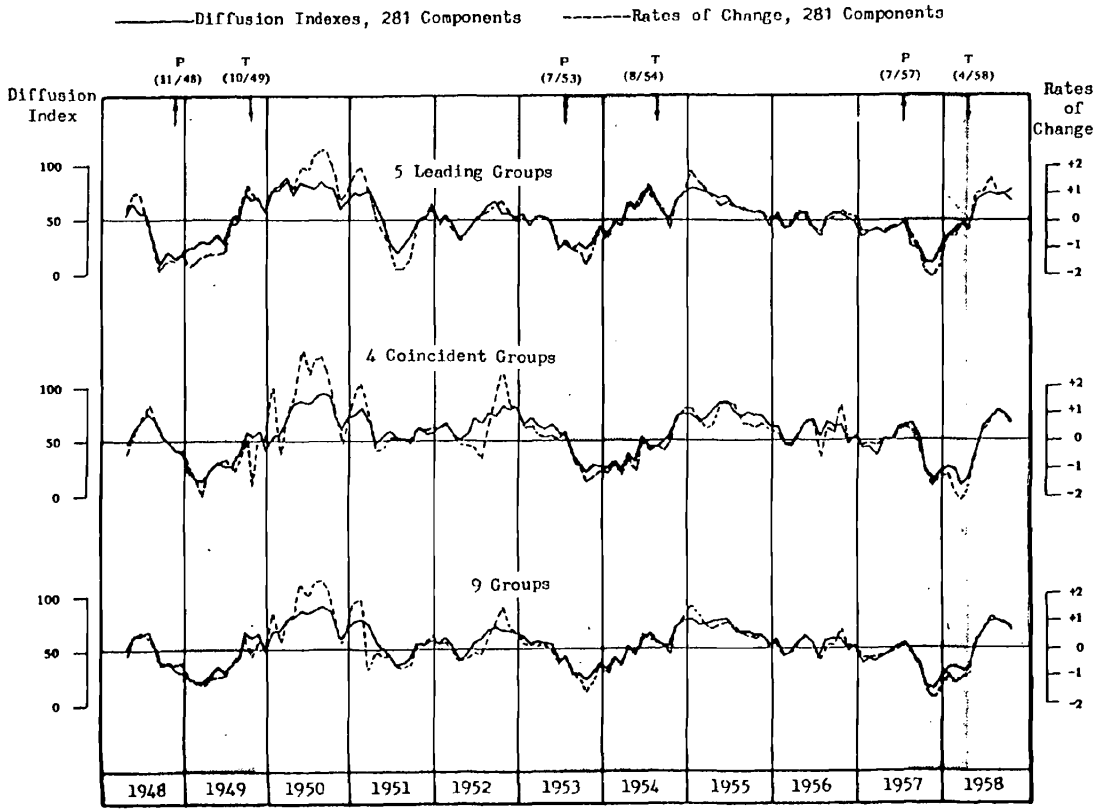
The figures are adjusted for differences in the number of trading days and in the average seasonal level of sales. The seasonal adjustment was made by dividing each dealer's sales by the seasonal index for the industry, on the assumption that there would be relatively little difference in seasonality in auto sales over the country. This assumption is not entirely valid, and a better procedure would be to adjust each dealer's sales separately. This was not feasible because of discontinuities in the series for many of the dealers and the short period for which the individual dealers' records were compiled. The data were taken from the Census Bureau's current report on retail sales.

A set of adjusted rate of change series is compared with corresponding diffusion indexes in Chart A-2. Here all the measures shown are based upon unweighted averages of the same component series. Thus, the average rates of change for the five groups of leading series were each obtained as follows. First, five separate rate of change series were obtained by calculating unweighted averages of the rates of change in the component series for each of the following groups: (1) stock market prices for eighty-two to eighty-six industry groups (depending upon the period covered); (2) twenty-two food and raw material price series; (3) twenty-one new orders series by industry; (4) twenty-one workweek series by industry; and (5) forty-seven initial claims series by labor market area. The five average rate of change series thus obtained were, in turn, themselves averaged, with each assigned a weight of one. Hence the group of eighty-six stock price series and the group of twenty-two price series each had the same weight in the average despite the difference in the numbers of component series. Similarly, the diffusion indexes for each of the five groups were calculated, and a simple average of these diffusion indexes computed.

In a similar way, averages of the adjusted rates of change and the diffusion indexes for the coincident series were obtained by first calculating four separate rates of change and four diffusion indexes from the component series and then again, in turn, computing an unweighted mean of the four. The following groups were employed: industrial production in twenty-six industries; nonagricultural employment in

CHART A-2

Diffusion Indexes and Adjusted Rates of Change Based on 281 Components, 1948-58



thirteen industries; manufacturing employment in twenty-one industries; and retail sales in twenty-four types of stores. To obtain the composite figures based upon all 281 component series, the average rates of change and diffusion indexes for each of the nine groups were in turn averaged, with each of the nine groups given the same weight.

The movements of the adjusted rates of change and the diffusion indexes, so calculated, are quite similar, as can be seen from the chart. When measured by the average duration of run, the average rate of change series are smoother, as can be seen from the figures below. Occasionally, however, the rates of change show sharp short-term movements (often associated with labor disputes) that are scarcely reflected at all in the diffusion indexes. All the comparisons are made over three-month spans.

	Average Duration of Run	
Group	Rate of Change	Diffusion Index
Five leaders	2.00	1.83
Four general composites	2.10	1.93
All series	2.21	2.10

The diffusion indexes shown in Chart A-3 are identical to those in Chart A-2; that is, they are based upon unweighted group averages of 281 component series. The adjusted rate of change series in this chart are, however, based on only nine aggregate series, one for each of the groups used in constructing the diffusion indexes; that is, the component series were not used in the computation of the adjusted rate of change series in Chart A-3, and these series are instead based on the nine aggregates for the corresponding groups (the index of stock prices, the index of industrial materials prices, and the aggregate series for average hours worked, new orders, initial claims, industrial production, nonagricultural employment, manufacturing employment, and retail sales). In contrast, the adjusted rate of change series in Chart A-2 are calculated from 281 component series. In Chart A-4 the adjusted rate of change series computed from aggregates are compared with those computed from components. All these comparisons are also made over three-month spans.

Again the adjusted rates of change series and the diffusion indexes are quite similar. This exercise indicates that similar results can be obtained from a small number of aggregates using adjusted rates of change (here nine) and from a diffusion index or an adjusted rate of change index based upon many component series (here 281).

Finally, comparisons of adjusted rates of change based on aggregates and the corresponding diffusion indexes are made for each of the nine separate groups in Chart A-5. They reveal that adjusted rate of

CHART A-3

Diffusion Indexes Based on 281 Components and Adjusted Rates of Change Based on Nine Aggregates, 1948-58

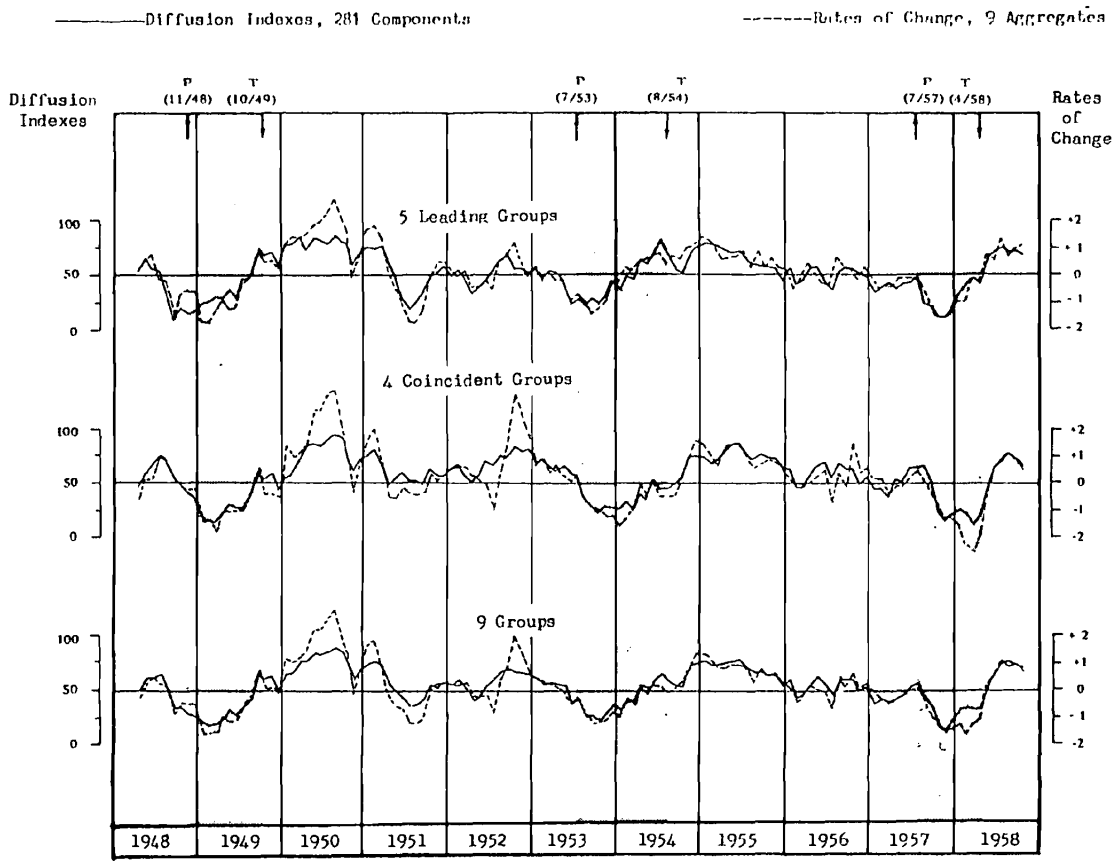
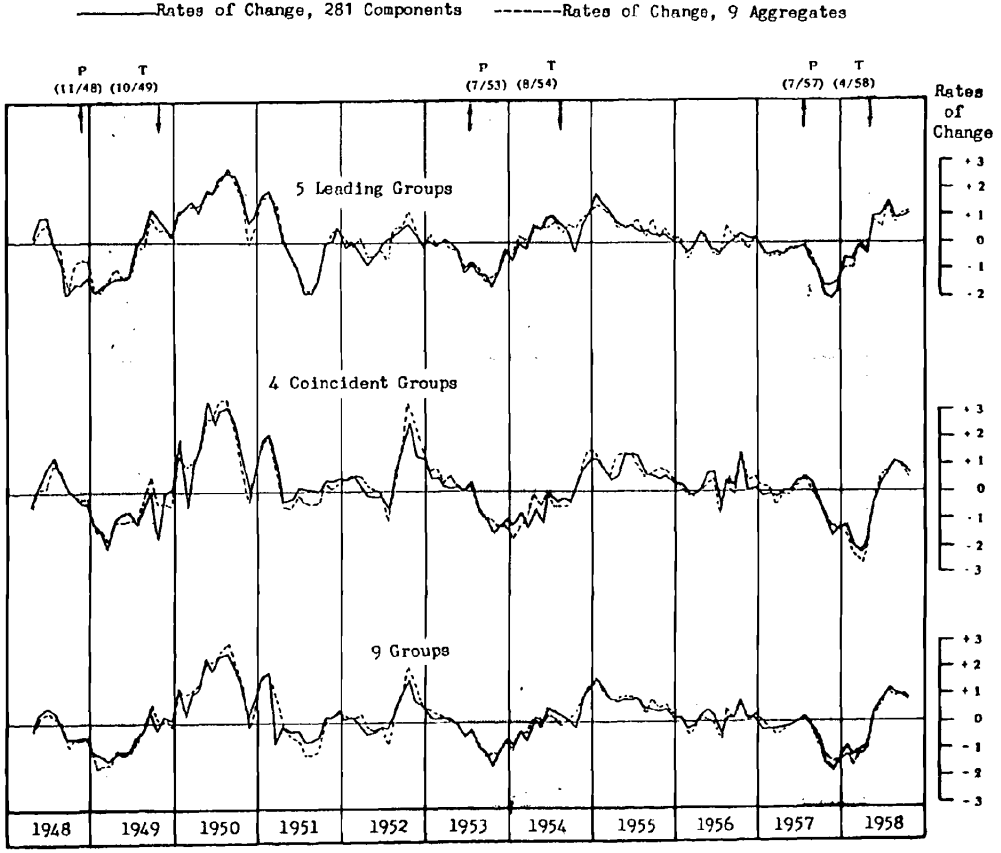


CHART A-4

Adjusted Rates of Change Based on 281 Components and Nine Aggregates, 1948-58



change series and diffusion indexes for less comprehensive groupings also are quite similar, though not as similar as their averages.

General Considerations

An important conclusion to be drawn from these results, as well as from similar experiments reported elsewhere, is that the scope of an expansion or contraction is of prime significance in determining the rate of change in measures of aggregate economic activity. Variations in the rate of growth from one expansion to another, or during the same expansion, are closely related to the number of economic processes or industries participating in it, regardless of their own rates of growth. Hence it is important to know how widespread a recession or recovery is, whether it is continuing to spread, and what policies or developments are likely to make it spread still further.

In considering the adjusted rates of change and the diffusion indexes, their differences as well as their similarities should be kept in mind. Thus the diffusion indexes are occasionally somewhat smoother, particularly in periods of abrupt changes as, for example, during strikes. This difference occurs because a diffusion index gives all changes the same weight, regardless of their extent, whereas a pronounced change in an important component series implicitly will be given a heavy weight in an average rate of change. On the other hand, adjusted rates of change indexes are easier to prepare than diffusion indexes once the aggregates have been compiled, because the computations involve only the aggregates and not the component series. They can, therefore, more readily be extended to earlier periods, to new bodies of economic data, and to data covering shorter time intervals (e.g., weeks) than diffusion indexes. In addition, adjusted rates of change take into account the magnitudes of change over different cyclical stages and different cycles.

Despite the broad similarity in the movements of diffusion indexes and adjusted rates of changes, it should not be supposed that they will always yield the same conclusions. For example, in comparing the timing of the leading groups with the coincident groups in Chart A-2, a number of instances may be observed where the turn in the leading group diffusion index occurs well in advance of the corresponding turn in the coincident group diffusion index, but the turns in their respective rates of change are more nearly coincident or even reversed. This was true at the trough in 1948-49, the peak in 1950, the trough in 1951, the peak in 1952, and the peak in 1955. The timing relationship between the adjusted rates of change might, therefore, appear to be somewhat different from that between the diffusion indexes for the two groups.

The results are better for the adjusted rates of change when the

CHART A-5

Diffusion Indexes and Adjusted Rates of Change for Individual Groups of Series and Aggregates, 1948-58

Part A: Leading Series

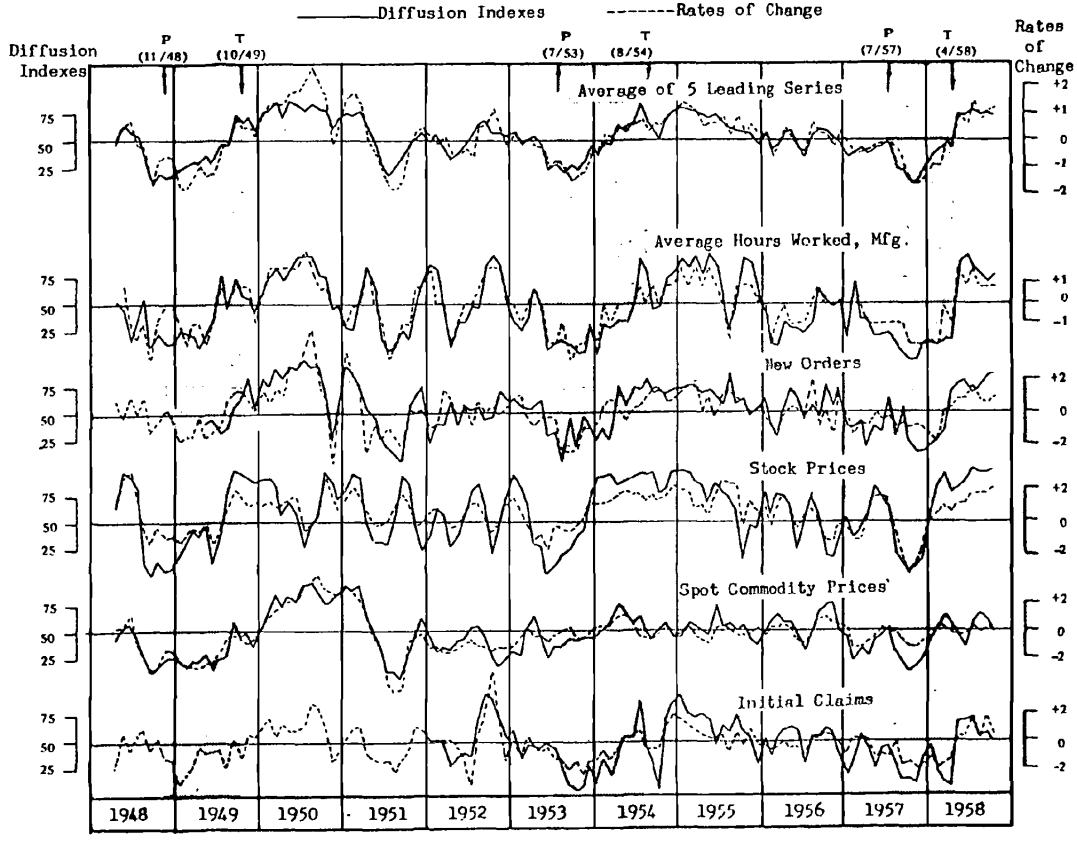
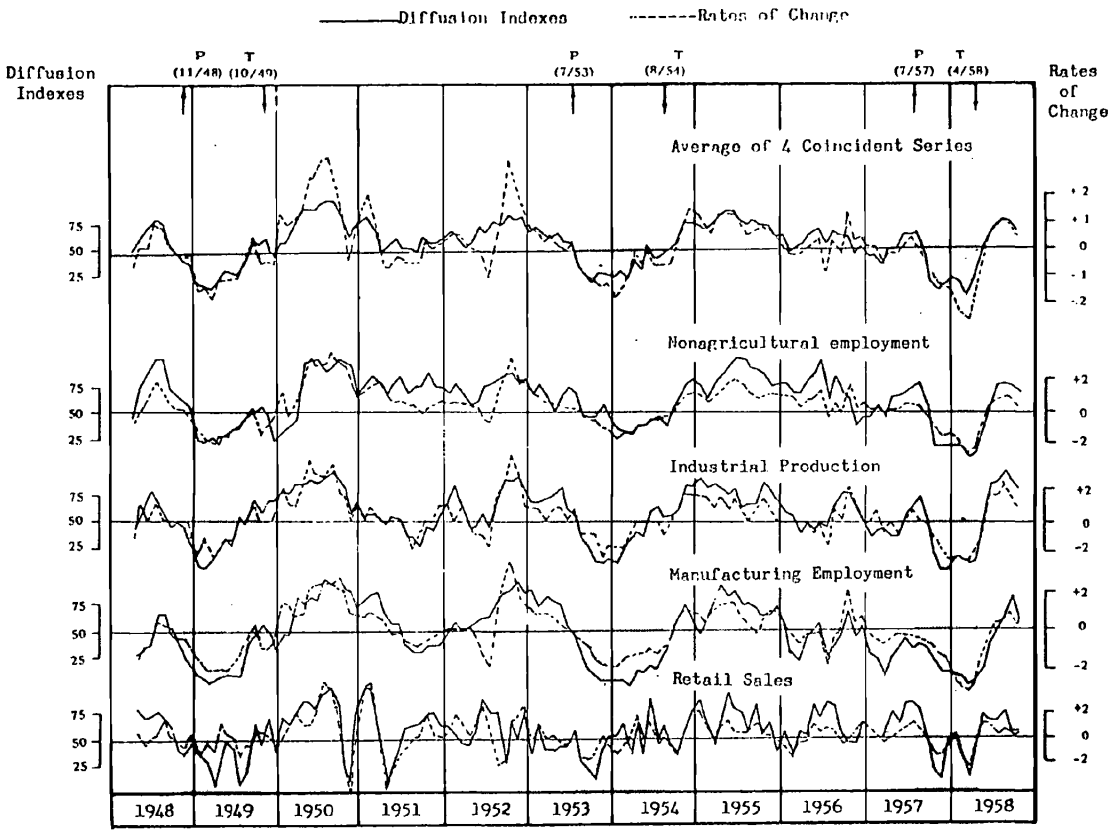


CHART A-5 (concluded)

Part B: Coincident Series



leading and coincident series are compared for the period since World War II in text Chart 3, Part B; the only out of phase movement in this chart, where the selection of series for the indexes is somewhat different, occurred in 1949. Thus the results of the comparisons in Chart A-2 may be accidental. But they may also be due to something more substantive. A plausible explanation is that the diffusion index has a greater power to expose the *cyclical* movements in the components (because the rates of change are influenced to a greater degree by the irregular fluctuations) and the differences in timing are greater for the cyclical than for the irregular movements. (In the case of an irregular movement caused by a strike, a storm, or a natural disaster, leading and other economic processes may all be affected at about the same time.) This hypothesis needs further exploration however.

As a general rule, the average rate of change and diffusion index series are smoothed by increasing the number of series to be averaged, because of differences in the timing of irregularities. However, this is not always true. If the additional series are more irregular than the original series, the resulting average will sometimes be more irregular than the original average. This points up the need for smooth series in compiling various indexes for business cycle studies. The use of *MCD* moving averages in place of seasonally adjusted series may be helpful in achieving this objective, because such moving averages have roughly the same degree of irregularity. Consequently, *MCD* curves make possible the construction of not only smoother but also more comprehensive indexes. Adjusted average rates of change, computed from *MCD* curves of various economic indicators, would therefore appear to offer particularly good prospects for developing new indicators. For example, an index of new orders might be constructed in this manner from the industry components of the present aggregate, with possibly useful results.[4]

[4] For discussions of the relations between rates of change series and diffusion indexes, see "The Diffusion of Business Cycles" and "Diffusion Indexes, Rates of Change, and Forecasting," both by Geoffrey H. Moore, *Business Cycle Indicators*, Volume I, Chapters 8 and 9. See also, Arthur L. Broida, "Diffusion Indexes," *American Statistician*, June 1955, pp. 7-16; Sidney S. Alexander, "Rate of Change Approaches to Forecasting—Diffusion Indexes and First Differences," *The Economic Journal*, June 1958, pp. 288-301; Bert G. Hickman, "Diffusion, Acceleration, and Business Cycles," *American Economic Review*, September 1959, pp. 535-565; and the references in these articles. The modified rate of change formula was suggested by Burns and Mitchell in *Measuring Business Cycles*, p. 143, and by Charles H. Cooley in "Observations on the Measure of Change," *The American Statistical Association Quarterly*, March 1893.

For other methods of deriving amplitude-adjusted indexes, see Edwin B. Frickey, *Economic Fluctuations in the United States*, Cambridge, Mass., 1942, pp. 91-100; and "The Predictive Value of the National Bureau's Leading Indicators," by Frank E. Morris, and "An Amplitude Adjustment for the Leading Indicators," by Geoffrey H. Moore, *Business Cycle Indicators*, Volume I, Chapters 4 and 19.

An incidental advantage of adjusted over conventional rates of change is that they can readily be used in comparisons that include inverted series. In most parts of our monthly report, series such as unemployment and liabilities of business failures, which conform well but inversely to the business cycle, are charted on an inverted basis; that is, rises are shown as declines and declines as rises. There is no easy method for comparing rates of change in inverted series with rates in positively conforming series if the conventional formula is used, because of the unequal range of positive and negative values. On the other hand, adjusted rates of change for inverted series can be compared with others merely by reversing signs.

Cyclical Comparisons of Adjusted Rates of Change

Adjusted rates of change are also useful in comparing the magnitudes of cyclical changes of different series over various monthly spans. The percentage change comparisons made in the text for different series over successive recessions or expansions are computed by the conventional formula. Such computations do not, however, permit comparisons among series nor the averaging of percentage changes for different series, because the range of variation in one series differs from that in another. Since the historical average adjusted percentage change for each series is one, comparisons of adjusted rates of change can easily be made among the different series. Series showing rates of change greater than one for any cycle are changing more than their average for the given span; series showing rates of change less than one are changing less than their average. In addition, the series with the higher rates of increase are expanding rapidly relative to the other series, and series with the smaller rates of change relatively slowly. Also, adjusted rates of change for different series can be averaged, so that the performance of groups of series (e.g., leading, coincident, and lagging) in a current cyclical phase can be compared with their performance in similar cyclical phases of other cycles.

In standardizing modified rates of change for cyclical comparisons, the historical average modified rate of change (without regard to sign) for the span in question must be used as the standardizing constant. Thus, if comparisons of the first six months of nine recessions are being made, the modified percentage change from the business cycle peak to the sixth month after the peak for each recession is divided by the average for the nine recessions being compared. The use of any other factor will not yield an average change of one. One month later, a new standardizing constant must be used, the average change over the first seven months of all the recessions included; and so on.

Cyclical comparisons based upon adjusted rather than conventional rates of change are shown in Tables A-1 and A-2. The average adjusted rates of change for the leading, coincident, and lagging groups are also shown in these tables. These tables correspond in all other ways to text Tables 10A and 10C.

Month-to-Month Comparisons of Adjusted Rates of Change

As indicated in the text, adjusted month-to-month rates of change have properties similar to those computed over like cyclical spans; their range of fluctuations is symmetrical and their historical average is one. They, therefore, facilitate judgments about the relative significance of the current month's change in a given series, and among different series. Tables of month-to-month adjusted rates of change reveal clearly not only which series are rising and declining, as do the conventional percentage changes, but also which are currently changing more than their own historical average, and which of a group are changing the most and least rapidly (see text, pp. 43 and Table 3).

TABLE A-1

Comparison of Nine Recent Business Cycle Contractions

Adjusted Percentage Changes for Principal Business Indicators from Preceding Business Cycle Peak Levels to Levels Nine Months After Business Cycle Peaks

	Average Modified Rate	*Contraction Periods*								
		Jan. 1920 to Oct. 1920	May 1923 to Feb. 1924	Oct. 1926 to July 1927	Aug. 1929 to May 1930	May 1937 to Feb. 1938	Nov. 1948 to Aug. 1949	July 1953 to Apr. 1954	July 1957 to Apr. 1958	May 1960 to Feb. 1961
Leading Series										
General index, 8 series (1,9,13,17,19,23,24,29)	2.43	—1.87	—0.22	—0.17	—1.84	—2.48	—0.78	—0.35	—0.91	—0.36
1. Average workweek, mfg.	2.42	n.a.	—0.93	—0.34	—1.76	—2.93	—0.31	—0.62	—0.73	—0.37
2. Accession rate, mfg.	19.66	—1.71	—2.02	—0.85	—1.92	—0.55	—0.36	—1.12	—0.33	—0.14
3. Layoff rate, mfg. (inv.)	29.93	—3.02	—0.67	—0.12	—1.05	—1.49	—0.56	—1.05	—0.91	—0.14
6. Mfrs.' new orders, durables	11.87	—2.24	+0.57	—0.48	—1.48	—1.91	—0.49	—0.69	+0.81	—0.34
7. New nonfarm dwelling units started	12.51	—2.37	+1.14	—0.54	—1.79	—1.21	+0.96	+0.29	—0.15	—0.54
9. Com., ind., constr. contracts	18.57	—2.94	+0.13	—0.29	—1.16	—1.95	—1.32	—0.10	—0.83	—0.27
13. New business incorp.	4.94	—1.74	—1.52	—0.07	—0.52	—1.77	0.00	+1.25	—0.94	—1.19
14. Liab. of bus. failures (inv.)	20.65	—3.38	+0.50	—0.80	—0.80	—1.09	—0.40	—0.41	—1.24	+0.38
16. Corporate profits, Q	25.55	—3.20	—0.37	—0.60	—1.57	—1.62	—0.44	—0.38	—0.51	—0.31
19. Index of stock prices	6.80	—0.66	+0.14	+1.06	—1.64	—2.83	—0.13	+0.97	—0.81	+0.76
23. Industr. materials prices	7.20	—1.80	—0.54	—0.24	—1.33	—2.12	—1.69	—0.02	—0.97	—0.29

Roughly Coincident Series										
General index, 6 series (41,43,47,51,52,54)	3.64	—1.81	—0.17	—0.12	—1.76	—2.19	—0.82	—0.80	—0.87	—0.46
41. Employ. in nonagric. establish.	2.58	—2.57	—0.70	—0.40	—1.30	—1.43	—0.70	—0.58	—0.90	—0.42
43. Unemployment rate (inv.)	25.92	n.a.	n.a.	n.a.	+1.01	—0.84	—1.18	—1.44	—1.02	—0.52
47. Industrial prod. index	5.83	—0.80	—0.31	—0.28	—1.35	—2.95	—0.54	—0.85	—1.31	—0.60
49. GNP, current dollars, Q	2.03	n.a.	+0.67	+0.12	—1.96	—3.08	—0.67	—0.60	—0.64	—0.27
50. GNP, 1954 dollars, Q	1.30	n.a.	n.a.	n.a.	n.a.	n.a.	—0.22	—1.34	—1.56	—0.87
51. Bank debits outside NYC	2.81	—0.44	+0.36	+0.40	—2.98	—3.13	—0.85	+0.17	—0.44	+0.22
52. Personal income	1.77	n.a.	+0.76	+0.43	—2.61	—2.81	—0.88	—0.28	—0.09	+0.14
54. Sales of retail stores	1.82	—0.26	+0.56	0.00	—1.72	—4.16	—0.40	—0.08	—0.74	—1.08
55. Wholesale price index (excl. farm and foods)	1.40	+0.14	—1.70	—2.11	—1.56	—1.44	—1.56	—0.10	—0.14	—0.25
Lagging Series										
General index, 3 series (62,64,66)	0.72	n.a.	n.a.	n.a.	—0.59	+2.94	0.00	+0.94	+0.94	+0.59
61. New plant, equip., expend., Q	5.76	n.a.	n.a.	n.a.	n.a.	n.a.	—1.44	—0.20	—1.90	—0.46
62. Labor cost/unit of output	2.22	+2.45	+0.93	—0.24	0.00	+1.74	—0.71	+0.78	—1.64	+0.51
64. Mfrs.' inventories, total	1.78	n.a.	n.a.	n.a.	+0.46	+0.87	—1.64	—0.99	—1.36	—0.67
66. Consumer instalment debt	2.84	n.a.	n.a.	n.a.	—1.12	—0.44	+2.88	+0.72	+0.27	+0.56
67. Bank rate, short-term loans, Q	3.14	+1.96	—0.32	—0.03	—2.64	—0.44	—0.06	—0.04	—2.33	—1.17

Explanatory Notes

Average modified rates of change are shown in the first column. These are averages of 9 modified rates computed over each of the 9-month contraction periods listed in the column headings. The individual modified rates (not shown in the table) are divided by their average. The resulting figures, shown in the subsequent columns, are the adjusted rates of change. The adjusted rates for each series, and consequently all the series, have an average of one.

TABLE A-2

COMPARISON OF EIGHT RECENT BUSINESS CYCLE EXPANSIONS

Adjusted Percentage Changes for Principal Business Indicators from Preceding Business Cycle Peak Levels to Levels Twenty-Five Months After Business Cycle Troughs

	Average Modified Rate	Period Covered							
		Jan. 1920 to Aug. 1923	May 1923 to Aug. 1926	Oct. 1926 to Dec. 1929	Aug. 1929 to Apr. 1935	May 1937 to July 1940	Nov. 1948 to Nov. 1951	July 1953 to Sept. 1956	July 1957 to May 1960
Leading Series									
General index, 8 series (1,9,13,17,19,23,24,29)	3.18	—0.24	+0.42	—0.18	—4.78	—0.34	+0.82	+0.74	+0.47
1. Average workweek, mfg.	3.31	n.a.	—0.56	—0.57	—4.72	—0.78	+0.30	—0.04	+0.04
2. Accession rate, mfg.	19.62	—1.25	—2.05	—1.86	—1.87	+0.27	+0.22	—0.46	+0.02
3. Layoff rate, mfg. (inv.)	26.68	—2.52	—1.46	—1.56	—1.48	—0.45	0.00	—0.54	0.00
6. Mfrs.' new orders, durables	19.86	+1.02	+0.41	—0.59	+3.31	—0.88	+1.11	+0.40	+0.27
7. New nonfarm dwelling units started	20.26	+0.88	+0.74	—1.61	—2.60	+1.28	+0.46	—0.07	+0.36
9. Com., ind., constr. contracts	21.41	—2.64	+0.39	+0.39	—3.22	+0.28	—0.30	+0.55	+0.22
13. New bus. incorp.	8.75	—1.34	—0.32	—0.07	—2.24	—1.08	—0.03	+1.68	+1.24
14. Liab. of bus. failures (inv.)	25.24	—2.56	+0.74	—0.81	+1.82	—0.26	+0.66	—0.45	—0.70
16. Corporate profits, Q	12.88	—1.06	+0.07	+0.21	—5.12	+0.54	—0.34	+0.52	+0.14
19. Index of stock prices	22.88	—0.14	+0.88	+1.04	—2.34	—1.05	+0.82	+1.39	+0.34
23. Industr. materials prices	14.62	—1.74	—0.52	—0.38	—1.26	—3.25	+0.38	+0.46	+0.01

Roughly Coincident Series									
General index, 6 series (41,43,47,51,52,54)	5.46	—0.57	+0.52	+0.38	—3.71	—0.06	+1.33	+0.75	+0.68
41. Employ. in nonagric. establish.	2.75	—1.72	—0.70	+0.02	—3.30	+0.05	+1.16	+0.75	+0.31
43. Unemployment rate (inv.)	18.70	n.a.	n.a.	n.a.	—2.69	—0.56	+0.16	—1.10	—0.49
47. Industrial prod. index	5.32	+0.92	+0.63	+0.24	—2.84	+0.34	+1.56	+0.74	+0.74
49. GNP, current dollars, Q	8.59	n.a.	+0.66	+0.60	—2.54	+0.34	+1.40	+0.77	+0.70
50. GNP, 1954 dollars, Q	4.59	n.a.	n.a.	n.a.	n.a.	n.a.	+1.56	+0.70	+0.74
51. Bank debits outside NYC	10.04	—0.41	+0.78	+0.57	—3.01	—0.10	+1.32	+0.95	+0.86
52. Personal income	7.98	n.a.	+0.81	+0.62	—2.34	+0.14	+1.32	+0.96	+0.82
54. Sales of retail stores	5.77	+0.97	+0.66	+0.23	—2.70	+0.45	+1.30	+0.97	+0.72
55. Wholesale price index (excl. farm and foods)	6.03	—3.46	—0.57	—0.82	—1.35	—0.33	+0.73	+0.57	+0.17
Lagging Series									
General index, 3 series (62,64,66)	8.15	n.a.	n.a.	n.a.	—1.63	+0.41	+1.64	+0.89	+0.43
61. New plant, equip., expend., Q	7.64	n.a.	n.a.	n.a.	n.a.	n.a.	+1.16	+1.59	—0.26
62. Labor cost/unit of output	4.18	—2.62	—1.05	—0.69	—1.71	—0.62	+0.74	+0.43	+0.15
64. Mfrs.' inventories, total	7.59	n.a.	n.a.	n.a.	—1.96	+0.28	+1.94	+0.71	+0.11
66. Consumer instalment debt	17.18	n.a.	n.a.	n.a.	—1.08	+0.72	+1.54	+1.00	+0.67
67. Bank rate, short-term loans, Q	8.82	—0.49	—0.52	+1.04	—2.58	—0.71	+1.21	+0.87	+0.58

Explanatory Notes

Average modified rates of change are shown in the first column. These are averages of 8 modified rates computed over each of the 25-month expansion periods listed in the column headings. The individual modified rates (not shown in the table) are divided by their average. The resulting figures, shown in the subsequent columns, are the adjusted rates of change. The adjusted rates for each series, and consequently all the series, have an average of one.