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CHAPTER 4

Dating Specific and Business Cycles

ONCE A TIME series has been adjusted for seasonal variations, it is ready for analysis on the plan sketched in Chapter 2. That plan, it will be recalled, consists of two parts. Each series is broken into segments corresponding in time to successive business cycles in the country to which the series relates, and the principal characteristics of these segments are measured. Next, the series is broken into segments corresponding to its own specific cycles, and their characteristics are measured. But before the two sets of measurements can be made, the specific and business cycles must be identified and their turning points dated. This chapter is concerned with the technical problem of dating cyclical fluctuations.

I Dating Specific Cycles

To determine whether a time series has specific cycles, and if so, to fix the dates when each cycle began, culminated, and ended, we plot the data, both in their original form and after adjustment for seasonal variations, upon a semi-logarithmic chart and study the whole record in this graphic form. A typical chart of monthly data covering sixty years is about 7 feet long; its width ranges from about 1 to 3 feet, depending mainly on the size of the secular movement. As far as possible the scales are kept uniform. They are varied only in handling annual data, where we compress the horizontal scale; in monthly or quarterly series having exceedingly violent cyclical amplitudes, where we compress the vertical scale; and in the few series with plus or minus values, where the vertical scale eludes standardization.[1]

When charted, almost all monthly and quarterly series show cyclical

[1] The rigidity of the printed page has compelled us to vary rather freely the horizontal and vertical scales, both absolutely and relatively to one another, in the historical charts of this book.

fluctuations, but they are more or less obscured by secular and erratic movements. Our basic criterion for distinguishing these three types of movement is their duration. We conceive of secular trends as drifts toward higher or lower levels that persist in a given direction for periods long in relation to business cycles.[2] Erratic movements appear as alternations of rise and fall that cover usually a few months; the 'saw-tooth contour' characteristic of indexes of business conditions is still more characteristic of series that represent a narrower range of activities.[3] Intermediate between the persistent drifts that often cover decades and the oscillations that occur every few months, there appear in most series well-defined movements of rise and fall, the duration of which from trough to trough and from peak to peak is rarely less than two or more than seven years. These fluctuations varying in duration 'from more than one year to ten or twelve years' are our specific cycles; that is, they are fluctuations of the same order of duration as business cycles.

Occasionally the specific cycles of a series are superimposed upon cycles lasting from fifteen to twenty-five years. Such long waves are typical of building construction; they occur also in certain other activities, the full list of which we do not yet know. When we find specific cycles superimposed upon long cycles, both sets are marked off and analyzed on the same principles.[4] If we found only long cycles in a series we would analyze them, but not call them specific cycles.

The task of identifying specific cycles in a time series is easy or difficult according as their amplitudes are large or small in comparison with those of erratic and secular movements. The relative magnitude of the three types, and hence the difficulty of distinguishing among them, differs widely in the processes we analyze. For example, the specific cycles in employment and disbursements of wages can almost always be recognized with ease, while the specific cycles in security flotations are often obscured. In some series the specific cycles are hard to distinguish because of the difficulty of eliminating large and shifting seasonal fluctuations; for example, inventories of farm products. But in a large majority of our series the cyclical fluctuations stand out clearly on the charts.

When specific cycles are made doubtful by random movements, we smooth the data by moving averages and base judgments upon the curve of moving averages. When the secular trend rises sharply, we allow brief and mild declines to count as contractions of specific cycles. Similarly, when the secular trend falls sharply, brief and mild rises are counted as specific-cycle expansions. We do not recognize a rise and fall as a specific

[2] See Arthur F. Burns, *Production Trends in the United States since 1870*, Ch. II.

[3] Mitchell, *Business Cycles: The Problem and Its Setting*, pp. 329-30. See also Mitchell and Burns, Statistical Indicators of Cyclical Revivals (National Bureau of Economic Research, *Bulletin 69*, May 28, 1938), pp. 4-8.

[4] See Ch. 11, Sec. I and VII.

cycle unless its duration is at least fifteen months, whether measured from peak to peak or from trough to trough. Fluctuations lasting less than two years are scrutinized with especial care; they are not treated as specific cycles unless they are clearly defined and in no sensible part a result of faulty adjustment for seasonal variations. The lower limit of the range of amplitudes of all fluctuations that we class confidently as specific cycles is our rough guide in deciding whether any doubtful fluctuation, of long or short duration, is well enough defined to be accepted as a specific cycle. Our general practice is to identify specific cycles without consulting the 'reference dates of business cycles', which are explained later in this chapter. We depart from this rule only in treating series that conform with great regularity to business cycles. In such series we first determine whether there are any lapses from one-to-one correspondence between specific and business cycles. If there are and they are due to our failure to class movements close to the borderline of our rules as specific cycles, the rules are relaxed and these movements accepted as specific cycles.[5]

Once the specific cycles have been distinguished we proceed to date their turning points. When the cycles are clear in outline, our practice is to take the lowest and highest points of the plotted curves as the dates of the cyclical turns. When the crests or troughs are 'flat', the latest month in the horizontal zone is chosen as the turning date.[6] The chief difficulties arise when erratic movements are prominent in the vicinity of a cyclical turn. Then we examine the several competing peaks or troughs to determine whether any are due to inadequate seasonal correction. That question settled, let us say for the peaks, we compare the average levels of several months centered on each potential peak and select as the actual peak the highest point in the cluster having the highest average level. If the averages of several clusters are approximately the same, we give preference to the highest point in the latest cluster, provided the movement in the period spanning the multiple peaks is not clearly downward.[7] Finally, if the series is especially choppy in the turning zone, moving averages are used to help determine the month of the peak or trough. We rarely deviate from these rules. The main exceptions come when an isolated high point occurs many months before or after the general contour of a curve indicates a cyclical peak, or when an isolated low point occurs many months before or after the general contour indicates a cyclical trough. We aim especially to disregard such extreme isolated

[5] See the illustrations on pp. 314-5.

[6] Horizontal movements may be an intrinsic feature of the data (as in central bank discount rates) or merely a technical effect of rounding. In the latter case the rule in the text imparts a bias, in the sense that turns dated from, say, three-digit figures must coincide with or come later than turns dated from four-digit figures of the same series. This point is usually of slight practical importance, but bears watching when refined comparisons are attempted.

[7] See also pp. 148, 346.

values as we know are associated with strikes, tariff changes, or other random events.

An illustration or two may make the procedure clearer. In a series such as coke production in the United States (see Chart 1 and Table 4) the specific cycles stand out clearly and their dating is easy. One possible doubt is with respect to the movement from June 1917 to January 1918. We do not treat this contraction as a cyclical movement. In the first place, the dip is slight except for the low values in January and February 1918, which reflect the disturbance in railroad operations and in the iron industry caused by extreme winter weather. In any event June 1917 is only thirteen months from the cyclical peak recognized in July 1918, too

TABLE 13

Bituminous Coal Production, United States, 1905–1939

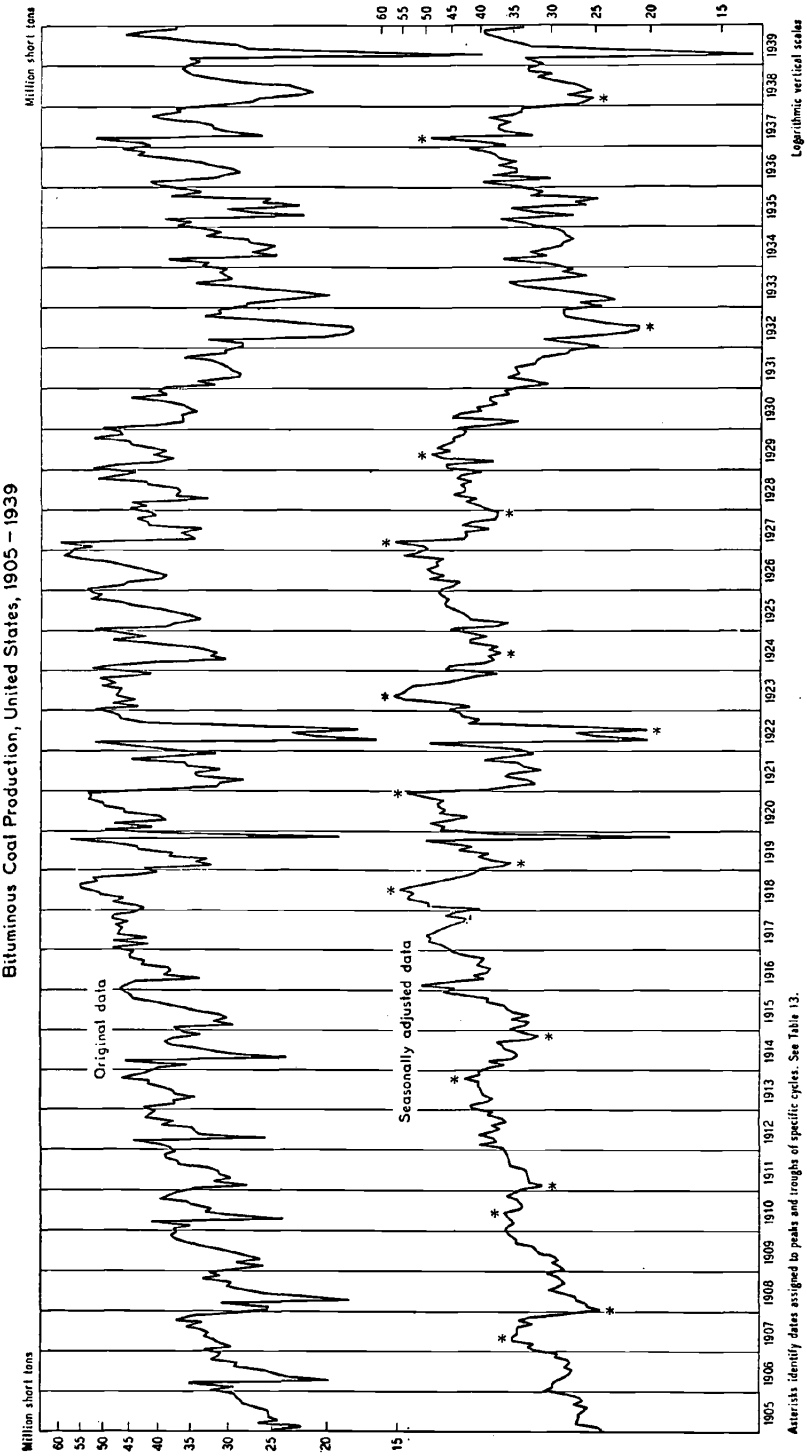
(*Millions of short tons*)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1905	24.2	24.7	26.9	26.7	26.6	26.6	25.9	25.6	27.1	26.1	26.5	28.1
1906	30.6	29.5	29.5	29.1	28.0	27.5	27.2	28.1	27.5	27.6	29.2	28.9
1907	31.9	32.8	31.8	34.8	34.8	34.1	34.2	34.1	32.1	34.0	32.2	28.2
1908	24.3	25.6	25.8	26.9	26.9	28.2	30.0	28.8	28.1	28.5	29.0	30.2
1909	28.1	28.7	29.5	28.8	29.4	31.2	31.7	32.1	34.3	34.2	34.9	35.6
1910	35.8	35.4	34.5	35.1	35.7	36.0	33.7	33.3	33.7	34.1	35.6	34.6
1911	33.3	30.8	32.4	32.5	32.7	32.8	33.1	35.2	35.3	35.4	35.6	35.9
1912	36.2	39.8	37.1	37.6	40.0	37.7	36.5	37.8	35.6	36.2	38.5	37.7
1913	41.1	41.2	38.3	37.6	39.2	39.4	39.7	40.0	39.8	42.4	39.6	39.9
1914	38.3	35.9	38.2	34.7	34.0	34.5	36.1	36.3	37.1	32.5	31.2	33.6
1915	35.1	32.9	32.4	34.9	32.5	34.7	35.6	35.9	38.7	38.4	43.0	46.3
1916	44.0	50.8	44.7	39.1	40.8	38.5	38.1	40.3	39.7	39.0	43.2	44.5
1917	45.3	46.5	48.9	48.7	49.6	47.8	46.3	44.7	42.5	42.0	45.9	44.4
1918	39.8	49.2	49.1	53.5	53.1	52.1	55.0	52.0	48.3	45.5	42.2	40.6
1919	39.8	36.1	35.0	38.0	40.2	38.5	43.4	41.1	45.5	49.7	18.3	37.6
1920	46.9	46.2	48.9	45.1	41.9	47.0	46.0	47.2	47.4	46.3	50.6	53.8
1921	38.8	35.4	31.7	32.8	35.9	35.3	31.0	33.3	33.9	38.9	35.4	31.9
1922	33.8	40.4	49.0	20.1	25.0	26.9	20.2	27.6	41.7	39.9	43.0	43.3
1923	45.1	41.5	45.7	54.4	56.8	54.8	53.7	52.2	46.9	43.5	40.7	37.1
1924	45.7	45.0	39.0	37.5	38.5	36.6	38.3	37.0	41.6	41.4	38.6	41.7
1925	44.9	37.0	35.3	41.4	42.0	43.0	45.3	46.0	45.7	45.2	46.3	47.3
1926	46.3	44.0	43.1	49.0	46.1	48.4	49.5	47.4	47.6	46.2	54.3	51.5
1927	49.3	50.2	56.5	42.6	42.0	42.4	38.5	42.8	41.0	37.4	37.2	37.0
1928	39.0	40.0	42.2	40.4	44.3	42.4	42.4	43.1	41.2	43.8	42.9	39.7
1929	45.6	45.8	37.8	46.4	48.7	45.1	47.6	46.1	44.4	44.6	42.7	42.3
1930	43.8	38.2	34.2	44.8	43.3	39.7	40.5	37.2	38.3	38.2	35.4	36.2
1931	33.8	30.2	32.3	35.6	34.0	34.3	34.6	31.9	31.7	30.9	27.9	27.6
1932	24.6	27.0	30.8	25.4	22.1	20.9	20.8	23.5	26.2	28.3	28.4	28.4
1933	24.3	26.6	23.0	24.4	26.8	29.7	34.1	35.5	29.1	25.9	28.6	27.3
1934	29.1	31.1	36.3	30.5	32.6	30.1	28.6	28.4	27.4	28.2	28.4	29.3
1935	32.3	33.4	36.8	27.3	32.1	35.2	25.9	27.1	24.8	32.6	30.9	32.3
1936	35.0	39.5	30.0	38.0	34.3	34.4	37.1	34.5	37.0	37.5	39.0	41.8
1937	36.0	40.7	49.0	32.3	36.1	37.2	37.0	35.3	38.6	35.1	33.7	33.7
1938	27.0	26.1	25.2	28.0	25.4	26.2	26.9	29.6	31.7	29.9	32.9	32.9
1939	30.9	32.3	33.3	13.2	21.3	32.4	33.4	35.8	37.5	39.3	39.3	33.6

Adjusted for seasonal variations. The original data for 1905–22 come from the Geological Survey, *Mineral Resources of the United States*, 1922, Part II, pp. 464-5; for 1923–37, Bureau of Mines, annual numbers of *Mineral Resources* (since 1932 *Minerals Yearbook*) through 1939; for 1938–39, *Survey of Current Business*. (Slight revisions in the figures for 1938 and 1939 made later by the Bureau of Mines are ignored.)

CHART 4

Bituminous Coal Production, United States, 1905 – 1939



Asterisks identify dates assigned to peaks and troughs of specific cycles. See Table 13.

short an interval to pass as a specific cycle under our rules. The decline from January to July 1925 also fails to qualify as a specific-cycle contraction. This movement is mild and does not meet our rule concerning durations: January 1925 is only thirteen months from the peak recognized in February 1926, while July 1925 is only twelve months from the trough recognized in July 1924.

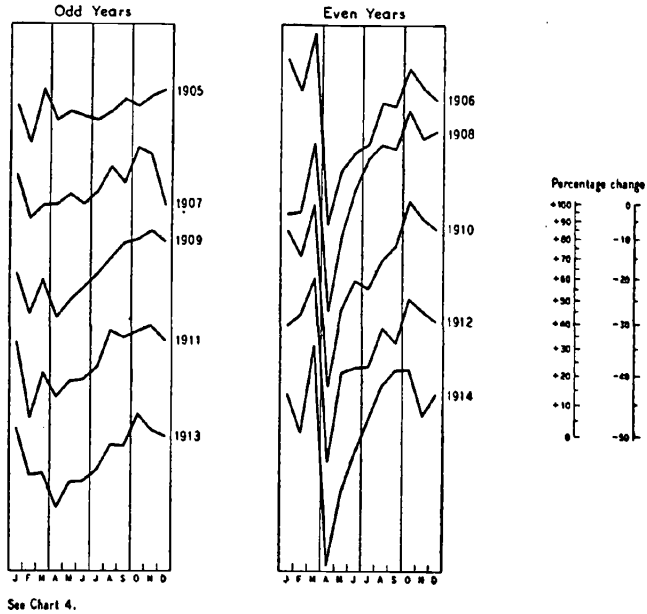
A better illustration of the problems encountered in identifying specific cycles is afforded by bituminous coal production in the United States (see Table 13 and Chart 4), an industry notorious for its seasonal fluctuations and labor disputes. A preliminary attempt to eliminate seasonal variations by our standard devices yielded such poor results that it was impossible to date the specific cycles reliably. After a little study it became apparent that at least from 1904 to 1914 strikes had a clear periodicity, and this fact provided a clue to analysis. A large section of the miners operated under two-year agreements, which expired April 1 of every 'even' year. For several months before the agreements were due for renewal, there was general uncertainty as to the outcome of the negotiations, and consumers sought protection by adding to their stocks of coal. In many mines operations were actually suspended in April. But soon a new agreement was reached, gradually the miners returned to work, the curve of production rose again, at first sharply, then more gently, and by July or August the usual seasonal pattern was being repeated. The differences between the odd (peace) and even (strike) years [8] before 1914 are sufficiently strong and regular to justify separate seasonal indexes (Chart 5). By adopting this expedient we finally attained a curve from which specific cycles up to 1914 could be dated with ease and confidence (Chart 4).

Some of the later years, however, are troublesome. During 1914–19 three successive waves may be distinguished. We could not accept all as specific cycles. The first decline extends from February 1916 to July 1916, the second from May 1917 to January 1918, the third from July 1918 to March 1919. There can be little doubt that the third is of sufficient magnitude to be considered a cyclical movement. But are the two preceding declines also to be treated as cyclical contractions? The decline from May 1917 to January 1918 is suspect on account of the seasonal adjustment. The original data testify to a sustained demand for coal throughout 1917; the usual lull in the spring and summer is absent. Indeed, the only notable drop during the entire period of our participation in World War I came in the winter of 1917–18, when severe storms tied up railroad traffic and caused car shortages. Even if the propriety of our seasonal

[8] 'Peace' and 'strike' years in the coal industry are a matter of degree. For a convenient tabulation of strike statistics, see The Effect of Labor Relations in the Bituminous Coal Industry upon Interstate Commerce (National Labor Relations Board, *Bulletin 2*, June 30, 1938), Table 13. For a chronicle of the industry in all its aspects, see the annual reviews of coal in *Mineral Resources* (of late called *Minerals Yearbook*) by the Bureau of Mines.

CHART 5

Ratios of Original Data to Twelve-month Moving Averages
Bituminous Coal Production, United States, 1905 – 1914



See Chart 4.

adjustments for 1917 and 1918 were not in question, we would have to disregard the decline from May 1917 to January 1918, since only 14 months separate its trough from the trough recognized in March 1919. On the other hand, the wave starting in November 1914 lasted 20 months, and thus manages to meet the duration test. But it lacks impressive amplitude. Moreover, it is due, in considerable part, to a spurt in anticipation of a strike in April 1916, followed by a drop when the strike failed to develop. Our decision, therefore, was to treat the declines of February–July 1916 and May 1917–January 1918 as interruptions of a cyclical expansion running from November 1914 to July 1918.

In addition to these uncertainties in identifying the specific cycles in coal production, several questions arise in dating their turns. The general movement of the data seems a sufficient reason for placing a trough in June 1924, instead of March 1925 when output was somewhat lower. Again, a trough is placed in March 1919, not in November 1919 when output was very much lower. The abrupt drop in November 1919 was due to a general coal strike. It caused merely a brief halt in the expansion that clearly got under way March 1919; for that reason we disregard it. For a similar reason the low value in April 1939 is disregarded, and the cyclical trough is dated March 1938. But we have not hesitated to date a cyclical trough in a month when a strike occurred if that month seemed

to coincide roughly with the end of a cyclical decline, or to date a cyclical peak in a month preceding the outbreak of a strike if it seemed roughly coincident with the end of a cyclical expansion. Our decisions to treat March 1927 as a specific-cycle peak and July 1922 as a specific-cycle trough are examples.[9]

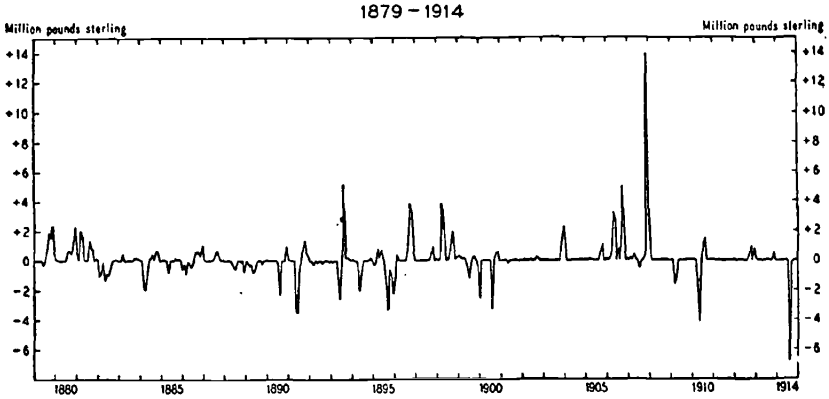
The trough in 1922 exemplifies a 'double bottom'. There is a deep trough in April 1922, when a strike—probably the greatest in the history of this afflicted industry—broke out. A slight revival occurred during the next two months, and a relapse in July, when the railroad shopmen's strike produced an acute car shortage in the non-union field. The seasonally adjusted figure is fractionally higher in July than in April (20.2 against 20.1 million tons). But the difference is negligible, and in line with our rules, the trough is dated in the later month.

Other illustrations of our method of dating specific cycles are provided in Table 19, which accompanies Chart 8, and in Charts 11 and 53. Some of the turning points are problematical, especially in series like share trading and structural steel orders, where erratic movements flourish. But no series in these charts is as extreme as net gold imports by the United States from the United Kingdom, pictured in Chart 6. No sus-

CHART 6

Net Gold Imports by the United States from the United Kingdom

1879 – 1914



Source: Great Britain, Board of Trade, *Accounts Relating to Trade and Navigation.*

tained movements of rise and fall can be detected in this series by the naked eye. By applying moving averages, the semblance of a cyclical movement could be created. But we cannot trust 'cyclical movements'

[9] The trough might have been set in July 1921 instead of July 1922. But output was only a little higher in Dec. 1921 than in July 1921, and it was considerably lower in April–July 1922. It is doubtful if a cyclical rise occurred between July 1921 and March 1922; for the apparent rise would vanish if the peak in a single month, March 1922, were removed. In setting the trough in July 1922, we assume that the sharp peak in March 1922 reflects entirely or largely the preparations for a strike.

that arise from a mathematical spreading of isolated peaks and troughs over surrounding months. Fortunately, series of this erratic type are very rare in our collection.

Our methods of determining specific cycles make no pretensions to elegance. Since no fast line separates erratic or episodic movements from specific cycles, or erratic turns from cyclical turns, there is ample opportunity for vagaries of judgment. At times our rules fail to yield a clear-cut decision. At times the members of our statistical staff disagree in their efforts to apply the rules to a given series. Our experience indicates that this difficulty cannot be removed by multiplying rules. The most effective way of coping with it is to organize the work on a plan that disciplines judgment. Hence when a new series comes up for analysis, three persons mark off its specific cycles, each working independently. If a conflict arises, the reasons for the divergent choices are discussed in conference. Sometimes, agreement is reached quickly. More often, new work must be undertaken, such as the application of moving averages to a troublesome period, or the recomputation of the seasonal adjustment, or detailed comparisons with related series, or research to clarify the background of some puzzling fluctuation. Once the conflict is settled, and the computations involved in the analysis of a series are completed and checked, the whole operation—including the dating of the specific-cycle turns—is 'audited' by an experienced member of our staff, who often has not participated in the work to this point. This process of checking may be repeated two or three times. For when a series previously analyzed is brought up to date, the occasion is made an opportunity for a thorough reexamination of all specific-cycle decisions. A check of this sort may come years after the original work has been done, and thus tests the consistency with which judgment has been applied. When earlier decisions seem faulty, we do not hesitate to reanalyze the series. Still another check on both the uniformity and reasonableness of the procedure comes when the data charts and cyclical measures are used by our collaborators in preparing their monographs on cyclical behavior.

These safeguards are adequate, we believe, to ensure trustworthy pictures of average specific-cycle behavior in the great majority of our series. A whimsical factor nevertheless remains in the measures of many individual cycles, and sometimes plagues even the average measures. These matters are discussed critically later in the book, especially in Chapter 8. Here we need only mention that in order to help readers judge the reliability of our results we plan to indicate in later monographs the amplitudes of erratic movements relatively to the specific cycles in each series analyzed, by a scale that runs from 'mild' to 'moderate', 'pronounced', and 'very pronounced'—terms that indicate roughly what degree of confidence we attach to our analysis of the specific cycles.[10]

[10] See pp. 153-4.

It might seem to some readers that the uncertainties connected with dating specific cycles could be overcome by eliminating secular trends and smoothing out erratic movements; but this is an illusion. Unless specific cycles are marked off prior to fitting a line of secular trend, and the line of trend is so fitted as to equilibrate exactly or approximately the plus and minus deviations within each cycle distinguished, widely differing results are possible with respect to the number and duration of specific cycles.[11] Of course, if secular trends are eliminated, some specific cycles not shown by our methods may be revealed. But once more, unless criteria are laid down, on the basis of study of the raw data, for the behavior of the trend line, many sorts of specific cycles may be found. The most refined procedure in computing trends offers no escape from the necessity of distinguishing cycles in the raw data or in their first differences.

Nor are the turns of specific cycles any easier to date in trend-adjusted than in raw data, for it is erratic movements that make most trouble at the turns. Smoothing by a sensitive graduation formula that produces continuous curvatures solves formally the dating of the turns; but it does not meet all the difficulties encountered in identifying specific cycles by our methods and it introduces some new difficulties. For example, it is still necessary to decide by arbitrary rule what movements are too brief or too mild to be considered specific cycles. More important, the process of smoothing may convert a steep random peak with a base of two or three months into a 'cycle' lasting two years or longer, or it may erase entirely a mild and brief cyclical movement in the raw data.[12]

We believe, therefore, that specific cycles dated from seasonally adjusted data are not less trustworthy than they would be if dated from data adjusted for secular and erratic as well as seasonal movements. At the same time we think that the dating of specific cycles could be improved by supplementing study of the charts of the original and seasonally adjusted data by study of several additional curves, one showing the seasonally adjusted data freed from erratic flutterings, another showing them adjusted for secular trend, and a third showing them adjusted for both secular trend and erratic movements. But to adjust many time series satisfactorily on this plan is extremely laborious and costly, and we have had to be satisfied with passing simple moving averages through doubtful portions of time series.

It is easier to mark off specific cycles in annual series than in monthly or quarterly.[13] But secular trends tend to obscure specific cycles far more potently in annual than in monthly data. While annual reporting does not affect the size of secular movements, it chops off the cyclical peaks

[11] See pp. 37-8. But note the comments on pp. 273-6.

[12] For illustrations, see Ch. 8, Sec. II.

[13] See pp. 215-6.

and fills in the cyclical troughs that would appear in data reported at briefer intervals.[14] For this reason, as well as because annual data often misrepresent the timing of peaks and troughs in what specific cycles do appear, we use such series only when dealing with crops that are harvested once a year, or when monthly or quarterly data are unavailable, or when monthly or quarterly data cover such short periods that we doubt their representative value.

II Diffusion of Specific Cycles

Not all time series exhibit specific cycles. For example, net gold imports (Chart 6) undergo large movements, but they are so brief and irregular that we cannot regard them as cyclical. Chart 7 presents several other series that seemingly are either free from specific cycles or undergo such movements only intermittently. Commutation traffic on railroads is a steady series, except for the shift to a lower level during the 1930's and minor erratic fluctuations throughout. Local transit in New York is also a steady series. The amount of milk used in the production of dairy products is more volatile; but what waves can be distinguished in this series are rendered uncertain by the nature of the seasonal adjustment. The remaining three series do not change at all for months or years, then rise or fall in a vertical step to a new level. We do not treat such movements as specific cycles unless the shifts in level are frequent enough to trace out, after their own fashion, a wave-like pattern with recognizable peaks and troughs.

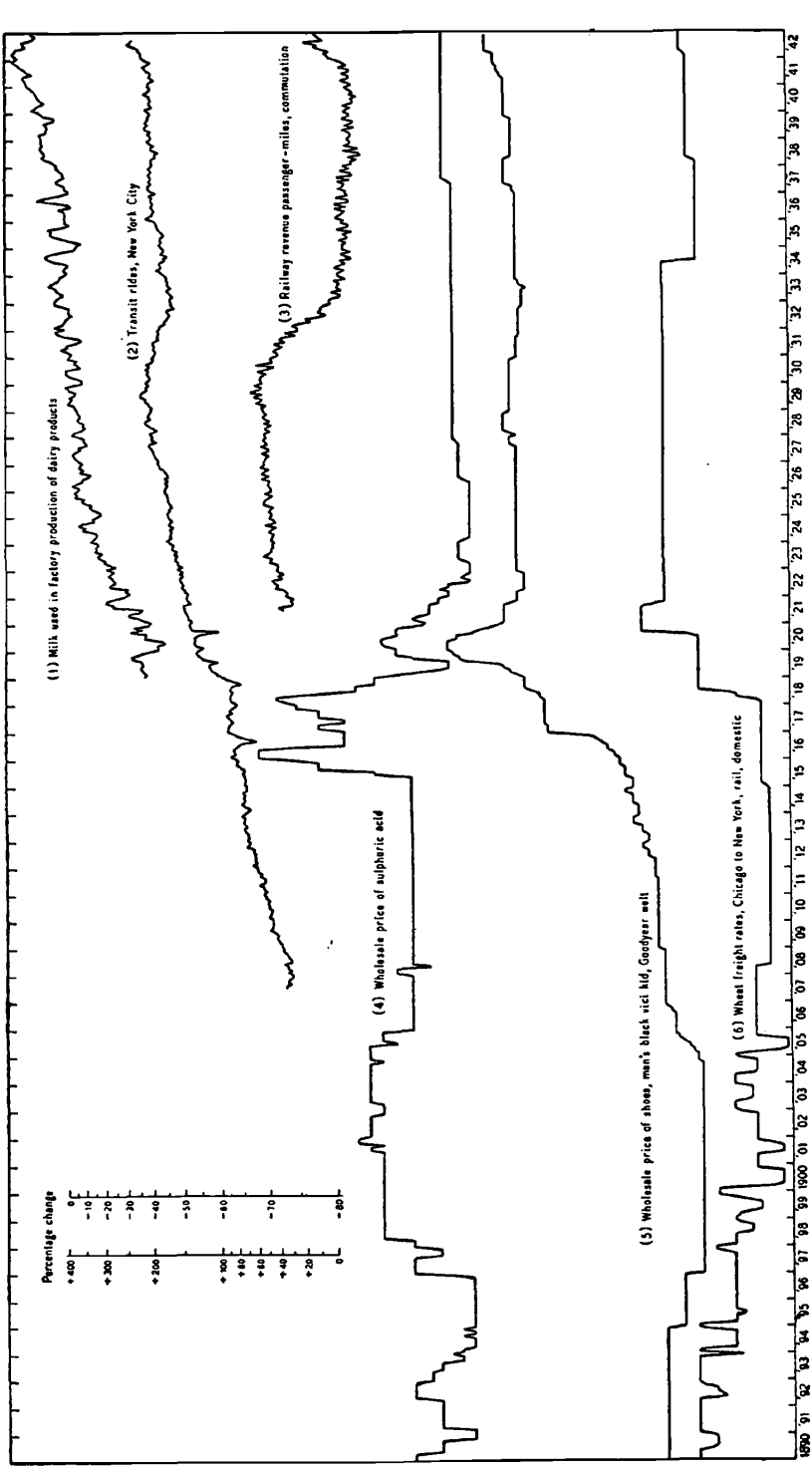
These series are instructive because they illustrate the diversity of behavior found in time series. They represent, however, exceptional types. A survey of our American series in monthly or quarterly form, made when the number analyzed was 828, showed that there were only 27, or slightly over 3 per cent, in which we found no specific cycles or only intermittent specific cycles. Of course, an investigator who insisted on greater regularity in durations than we do would surely find fewer series moving in specific cycles. The like would happen if the concept of specific cycles were restricted to fluctuations of closely similar amplitude. On the other hand, by adopting refined mathematical techniques, specific cycles might be found in so steady a series as transit rides in New York or in so jerky a series as net gold imports from the United Kingdom. But we do not wish to labor a defense of our detailed results. It may well be that now and then, despite the precautions taken to guard against 'cyclical bias', we have 'seen' cycles in series that have none in fact. After making liberal allowance for this possibility, we can still say that the great majority of series in our collection exhibit continuous fluctuations whose period corresponds to that specified by our working definition of business cycles.

These specific cycles are the basic 'raw materials' of this investigation.

[14] The shortcomings of annual data in studying business cycles are treated at length in Ch. 6.

CHART 7

Six American Series that Lack Continuous Specific Cycles



(1), (2) and (3) adjusted for seasonal variations. For sources of data, see Appendix C

TABLE 14

Chronology of Specific Cycles in Employment
Ten Manufacturing Industries, United States, 1919–1938

Date	Industries reaching a peak or *trough*[a]	Number of industries whose specific cycles			
		Reach a peak	Reach a trough	Undergo expansion[b]	Undergo contraction[b]
Feb. 1919	*Textiles**, *Stone**, *Lumber**	..	3	..	10
Mar. 1919	*Leather**	..	1	3	7
Apr. 1919		..	..	4	6
May 1919	*Food**, *Paper**, *Iron*, *Transportation equipment*	..	4	4	6
June 1919	*Machinery*	..	1	8	2
July 1919		..	..	9	1
Aug. 1919	*Tobacco*	..	1	9	1
Sep. '19–Nov. '19		..	..	10	..
Dec. 1919	Food, Lumber, Leather	3	..	10	..
Jan. 1920	Stone, Tobacco	2	..	7	3
Feb. 1920	Transportation equipment	1	..	5	5
Mar. 1920	Iron, Machinery	2	..	4	6
Apr. 1920	Textiles	1	..	2	8
May '20–June '20		..	..	1	9
July 1920	Paper	1	..	1	9
Aug. '20–Nov. '20		..	..	..	10
Dec. 1920	*Lumber*	..	1	..	10
Jan. 1921	*Textiles*, *Leather*, *Transportation equipment*	..	3	1	9
Feb. 1921	*Stone*	..	1	4	6
Mar. '21–Apr. '21		..	..	5	5
May 1921	*Paper*	..	1	5	5
June 1921		..	..	6	4
July 1921	*Iron*	..	1	6	4
Aug. 1921	*Food*	..	1	7	3
Sep. 1921	Textiles	1	..	8	2
Oct. 1921	*Machinery*	..	1	7	3
Nov. '21–Dec. '21		..	..	8	2
Jan. 1922	*Tobacco*	..	1	8	2
Feb. '22–Apr. '22		..	..	9	1
May 1922	*Textiles*	..	1	9	1
June 1922		..	..	10	..
July 1922	Tobacco	1	..	10	..
Aug. '22–Mar. '23		..	..	9	1
Apr. 1923	Leather	1	..	9	1
May 1923	Textiles	1	..	8	2
June 1923	Iron	1	..	7	3
July 1923	Stone, Lumber, Machinery	3	..	6	4
Aug. '23–Sep. '23		..	..	3	7
Oct. 1923	Food	1	..	3	7
Nov. 1923	Transportation equipment	1	..	2	8
Dec. '23–June '24		..	..	1	9
July 1924	*Textiles*, *Stone*, *Lumber*, *Leather*	..	4	1	9
Aug. 1924	*Iron*, *Transportation equipment*	..	2	5	5
Sep. 1924	*Machinery*	..	1	7	3
Oct. 1924	*Food*	..	1	8	2
Nov. '24–Feb. '25		..	..	9	1
Mar. 1925	Leather	1	..	9	1
Apr. '25–Oct. '25		..	..	8	2
Nov. 1925	Textiles, Transportation equipment	2	..	8	2
Dec. '25–Mar. '26		..	..	6	4
Apr. 1926	Lumber, *Leather*	1	1	6	4
May '26–June '26		..	..	6	4
July. 1926	*Textiles*	..	1	6	4
Aug. 1926	*Tobacco*	..	1	7	3
Sep. 1926	Iron, Stone	2	..	8	2
Oct. 1926	Machinery	1	..	6	4
Nov. 1926	Paper	1	..	5	5
Dec. 1926	Leather	1	..	4	6
Jan. '27–July '27		..	..	3	7
Aug. 1927	Textiles	1	..	3	7
Sep. 1927	Tobacco	1	..	2	8
Oct. 1927		..	..	1	9
Nov. 1927	*Transportation equipment*	..	1	1	9
Dec. 1927		..	.	2	8

TABLE 14—*Continued*

Chronology of Specific Cycles in Employment
Ten Manufacturing Industries, United States, 1919–1938

Date	Industries reaching a peak or *trough*[a]	Number of industries whose specific cycles			
		Reach a peak	Reach a trough	Undergo expansion[b]	Undergo contraction[b]
Jan. 1928	*Iron, Lumber, Machinery*	..	3	2	8
Feb. '28–Mar.'28		..	..	5	5
Apr. 1928	*Paper*	..	1	5	5
May '28–Aug.'28		..	..	6	4
Sep. 1928	*Textiles*	..	1	6	4
Oct. 1928		..	..	7	3
Nov. 1928	*Leather*	..	1	7	3
Dec. '28–Jan. '29		..	..	8	2
Feb. 1929	Transportation equipment	1	..	8	2
Mar.'29–June'29		..	..	7	3
July 1929	Textiles	1	..	7	3
Aug. 1929	Iron, Lumber, Machinery	3	..	6	4
Sep. 1929	Paper	1	..	3	7
Oct. 1929		..	..	2	8
Nov. 1929	Food, Leather	2	..	2	8
Dec. '29–Dec. '30		..	..	..	10
Jan. 1931	*Textiles*	..	1	..	10
Feb. '31–June '31		..	..	1	9
July 1931	Textiles	1	..	1	9
Aug. '31–June '32		..	..	..	10
July 1932	*Food, Textiles, Leather*	..	3	..	10
Aug. 1932	*Lumber*	..	1	3	7
Sep. '32–Feb. '33		..	..	4	6
Mar. 1933	*Iron, Machinery*	..	2	4	6
Apr. 1933	*Paper, Stone, Transportation equipment, Tobacco*	..	4	6	4
May '33–Mar.'34		..	..	10	..
Apr. 1934	Tobacco	1	..	10	..
May '34–Sep. '34		..	..	9	1
Oct. 1934	Food	1	..	9	1
Nov. '34–Sep. '35		..	..	8	2
Oct. 1935	*Food*	..	1	8	2
Nov. '35–Jan. '36		..	..	9	1
Feb. 1936	*Tobacco*	..	1	9	1
Mar. '36–Oct. '36		..	..	10	..
Nov. 1936	Tobacco	1	..	10	..
Dec. '36–Mar.'37		..	..	9	1
Apr. 1937	Stone	1	..	9	1
May 1937	Textiles	1	..	8	2
June 1937	Paper, Leather	2	..	7	3
July 1937	Food, Lumber	2	..	5	5
Aug. 1937	Iron, Machinery, Transportation equipment	3	..	3	7
Sep. '37–May '38		..	..	..	10
June 1938	*Textiles, Paper, Stone, Lumber, Leather*	..	5	..	10
July 1938	*Iron, Machinery*	..	2	5	5
Aug. 1938	*Transportation equipment*	..	1	7	3
Sep. 1938		..	..	8	2
Oct. 1938	*Food*	..	1	8	2
Nov. '38–Dec. '38		..	..	9	1

Based on the Bureau of Labor Statistics indexes of factory employment, adjusted for seasonal variations by the Federal Reserve Board. Source: *Federal Reserve Bulletin*, Oct. 1938, pp. 842-5, and Oct. 1939, p. 880, except that revised figures for textiles in 1933–38, automobiles in 1919–22, and transportation equipment in July–Sept. 1938 were furnished directly.

The full titles of the ten industrial groups covered are iron, steel, and their products; machinery; transportation equipment (limited to automobiles prior to 1923); lumber and allied products; stone, clay, and glass products; textiles and their products; leather and its manufactures; food and kindred products; tobacco manufactures; paper and printing. Three industrial groups (chemicals and allied products, and petroleum refining; rubber products; nonferrous metals and their products) in the Bureau of Labor Statistics index are omitted here because their record does not go back to 1919.

*So far as possible, data on employment before 1919 and related records were consulted in dating the cyclical turns in 1919. The troughs marked with an asterisk are more uncertain than the others.

[a]Industries reaching a trough are italicized.

[b]For simplicity in tabulation, a rise or fall between two months is credited to the second month.

Our central problem is to determine how they fit together. The nature of this undertaking may be glimpsed from a highly simplified illustration. Table 14 lists, month by month, the specific-cycle turns of ten constituents of the Bureau of Labor Statistics index of factory employment during 1919–38. This information is developed in later columns, which show the number of industries in which employment rose or fell, reached a peak or trough, each month. A tendency toward a common rhythm can be detected in the table, but the different industries do not always keep in close step. Six industries—food products, tobacco, leather, textiles, paper and printing, and stone, clay and glass—occasionally 'skip' a cycle common to the other four, or trace out an 'extra' cycle. Even when corresponding cyclical turns are found in all ten series, they are dispersed over several months. For example, every series turned up in 1932–33, but the troughs span 10 months. The 'turning zone' is still longer at the upturn in 1921. On account of the divergencies in the timing of cyclical turns, all industries experience specific-cycle expansion or all experience specific-cycle contraction in only 69 of the 239 months covered, less than a third of the full period.

Let the reader imagine a thousand time series arranged on the plan of Table 14, and he will begin to face in their full complexity the timing relations among the cyclical movements of actual life. Such a table would show every month, or practically every month, some activities in an expanding phase, some beginning to recede from their peaks, some contracting, and some beginning to revive from their troughs. But although the four phases of expansion, recession, contraction, and revival will be found running side by side at all times, the basic conception that emerges from our studies is that at any one time one phase is dominant. Recession is evident in some activities in the first stage of the phase when expansion becomes dominant, and spreads gradually to other activities until recession replaces expansion as the dominant phase. Similarly, revival begins early in the phase when contraction becomes dominant, and spreads gradually until revival becomes dominant. Our hypothesis, in other words, is that a period in which expansions are concentrated is succeeded by another in which cyclical peaks are concentrated, by another in which contractions are concentrated, by another in which cyclical troughs are concentrated; and this round of events is repeated again and again. To expose this process of continual change, it is necessary to observe systematically the direction and amplitude of the cyclical movements of many activities.

If our analysis were restricted to a few time series, it would be simple to compare their specific cycles directly. But when the analysis covers hundreds of series, it is clumsy and wasteful to compare the timing of each series with every other; indeed, as clumsy and wasteful as it would be to express the exchange value of each commodity in terms of every

other commodity. Much clearer results can be attained by adopting some common denominator, that is, by setting up a reference scale on which every series can be laid out in strictly uniform fashion. Any scale is bound to be artificial in the sense that it will break apart movements that are continuous. But the scale should be as little artificial as possible. The cyclical changes going on all the time are highly complex: expansions and contractions of economic activities weave into one another. Nevertheless, if our concept of business cycles is valid, there must be certain years and months in which 'general business activity' reaches successive peaks and troughs. Approximations to these 'turning points' will give the reference scale we seek.

This reference scale will rest on two assumptions. First, we shall assume that business cycles run a continuous round, as explained in Chapter 1. Second, we shall assume that it is sufficient to mark off the dates when expansions and contractions in general business activity culminate. This implies that once business activity as a whole has reached a peak or trough, it does not linger there, but commences rather promptly to decline in the one case, to rise in the other. We believe that these assumptions are tolerably close to the run of experience. However, the validity of the reference scale built on this framework of assumptions must be fully tested. Whether the periods marked off by our reference scale actually correspond to business cycles in the sense of our definition, and if so how different activities are related in direction and amplitude from stage to stage of the business cycles, are precisely the questions this investigation must answer.

III Different Methods of Deriving a Reference Scale

The derivation of a reference scale of business cycles raises numerous problems. How should we proceed to ascertain the dates when the expansions and contractions in 'general business activity' culminate? One possible plan is to identify the central tendency in each cluster of turning points in individual economic activities. But how are different activities to be marked off from one another; that is, how are they to be classified and individualized? And how is the central tendency of their cyclical turns to be determined? Another plan would be to identify the turning points of a series measuring aggregate economic activity. But where are the boundaries of aggregate activity to be set? Can this 'quantity' be given a meaning that is at once significant for the purpose at hand and precise enough to be measurable? Suppose that much is done. Then it will still be necessary to check the cycles in the chosen measure of aggregate activity against the evidence of related series. But what series will serve this purpose and how are conflicts to be reconciled? It will also be necessary

to determine whether the cycles in aggregate activity are sufficiently diffused through the economy to rate as business cycles. What series or processes should be examined to determine this issue? Should the list be kept the same or varied from country to country and from period to period within a country? Must the fluctuation be reflected in all the items on the list or will some specified set or number or proportion suffice? Should not a fluctuation that satisfies the criterion of diffusion meet also certain criteria of duration and amplitude, phase by phase as well as for the entire fluctuation, before it is admitted to the family of business cycles? Finally, how should we distinguish between cyclical and erratic turns in aggregate activity; in other words, how are the uncertainties connected with dating the turning points of the specific cycles in the series chosen as a measure of aggregate activity, and in other series that may be used in conjunction with it, to be surmounted?

These tantalizing questions cannot be resolved by excogitation alone. The only practicable plan is to work with the facts in the light of tentative judgments and hypotheses, then revise the hypotheses in the light of the findings. Work with the facts can be organized on many different plans. An investigator whose main concern was to establish a chronology of business cycles might wish to spend years in studying specific cycles before venturing to date the peaks and troughs of business cycles. But our interest in a reference scale is largely incidental to theoretical ends. Early in the investigation it seemed wise to determine whether our working definition of business cycles was a promising guide to further inquiry, and if that seemed to be the case, to organize the work in such fashion that we could learn quickly, even if only approximately, how the cyclical fluctuations of leading economic activities are related to one another. For this purpose it was necessary to settle rather promptly on a reference scale of business cycles; conceived of as a tool of analysis that was to be tested, amended or, if need be, rejected in the course of further observation.

The simplest method of deriving such a scale would be to mark off the months in which the specific cycles of an acceptable measure of aggregate economic activity reached successive peaks and troughs. Aggregate activity can be given a definite meaning and made conceptually measurable by identifying it with gross national product at current prices. This total includes the values of all finished commodities and services reaching the final users in a nation during a given period, plus or minus any change in inventories held at points short of their final destination, plus or minus any change in claims on international account.[15] However, for the purpose of analyzing business cycles, it is better to restrict the total to the portion of the national product that passes through the 'market'. In ex-

[15] For a fuller explanation and supplementary definitions of this total, see Simon Kuznets, *National Income and Capital Formation, 1919–1935* (National Bureau of Economic Research, 1937), pp. 3-5, and especially pp. 34-5.

tending measurements into the past, an increasing part of agricultural production should be excluded; also production of all sorts within local, self-sufficient communities. Similar restrictions apply to other measures of aggregate activity that might be used, such as the physical volume of production or the volume of employment. They apply also, though with less force, to total income payments, and to total monetary transactions excluding, of course, trading in assets.

Unfortunately, no satisfactory series of any of these types is available by months or quarters for periods approximating those we seek to cover. Estimates of the value of the gross or net national product on a monthly or quarterly basis are still in an experimental stage. The Department of Commerce estimates of total income payments by months go back only to 1929. Recently, Harold Barger has prepared quarterly estimates of net and gross national product in the United States back to 1921. For Great Britain, Colin Clark has devised quarterly figures on national income since 1929. These statistical efforts represent an important step forward in the measurement of 'national income' by short time units, and bear considerable promise for the future. But as yet they rest heavily on estimates eked out from small samples or purely mathematical interpolations, which leave considerable margins of uncertainty in the final result.[16]

Index numbers of the physical volume of production by short time units are available for longer periods than national income estimates, but they too fail to meet our needs. The 'present' version of the Federal Reserve Board index of industrial production goes back only to 1923; an older version goes back to 1919, and a still older version to 1913. There the record stops. The one monthly index of production with reasonably adequate coverage before World War I is Babson's index of the physical volume of business, which starts in 1904. In our foreign countries tolerable indexes of production by months or quarters are available only since World War I. Even for recent years, indexes of production leave much to be desired. Thus the Federal Reserve Board index is restricted to manufacturing and mining, both covered on a sampling basis. Since the fluctuations of different branches of production synchronize imperfectly, a change in the sample of series included in a production index or in the weights assigned to the series may easily shift the date when the index reaches a cyclical peak or trough. Table 15 shows the turning points of the Federal Reserve Board index at different stages of its statistical history. The cyclical turns of the index developed by the Standard Statistics Company are presented on a similar plan, as are also the turns of the index

[16] See Frederick M. Cone, Monthly Income Payments in the United States, 1929–40 (Bureau of Foreign and Domestic Commerce, *Economic Series No. 6*); Harold Barger, *Outlay and Income in the United States: 1921–1938* (National Bureau of Economic Research, 1942); Colin Clark, *National Income and Outlay* (Macmillan, London, 1937), Ch. IX. See also *Review of Economic Statistics*, May 1943, p. 159, and *The Economist*, April 12, 1941, p. 489, and April 18, 1942, pp. 531-2.

of the Federal Reserve Bank of New York.[17] Sometimes the shifts in the cyclical turns from one index to another are negligible, but not always. The instability of cyclical turns disclosed by the table is a warning that the turning points of even the latest production indexes are approximations, not precise measurements.[18]

Employment series by months or quarters are no better suited to our needs than production indexes. Estimates of the number of civil non-agricultural employees in the United States go back to 1929 only. The index of the number of factory employees by the Bureau of Labor Statistics goes back to 1914, but is based on a slender sample before 1923. These series can be supplemented by data on the average number of hours worked per man-week, collected since 1920 (except for January–June 1922) by the National Industrial Conference Board and on a much wider scale by the Bureau of Labor Statistics since 1932. But there are practically no statistics of employment or unemployment on a national basis prior to World War I. Foreign countries, especially Great Britain, are more fortunate in this respect. In Germany trade-union unemployment percentages are available by months back to 1906 and by quarters back to 1903; in France by months since 1894, and in Great Britain by months since 1854. But the coverage of these foreign materials narrows as the records recede into the past: the British data before 1887 are limited to the Friendly Society of Iron Founders.

There are indeed some comparable monthly or quarterly series that extend over several decades in each or all except one of our four coun-

17 Some trend-adjusted indexes are placed deliberately in the table. If a rising trend were removed from a production index and nothing else changed, cyclical troughs of the trend-adjusted index would coincide with or come later than corresponding turns of the unadjusted index, while cyclical peaks would coincide or come earlier. (See Ch. 7 for an analysis of the influence of trend adjustments on cyclical timing and other measures of cyclical behavior.) The reader will note how frequently the actual relations among the several samples of production indexes are not in keeping with this simple model. The reason, of course, is that the trend-adjusted and unadjusted indexes differ in other respects—composition, weighting, etc.

18 This should be plain enough from the composition of any production index. The statistician who sets out to construct a production index must choose, in principle, between an index based on inadequate industrial coverage and an index based in part on crude estimates. In practice, he is sure to compromise. Thus the Federal Reserve Board index of 'industrial production' actually covers only the manufacturing and mining sectors. Of the 81 series included in the index, as revised in the *Federal Reserve Bulletin* of Aug. 1940, only 38 with a weight of 40.4 per cent (that is, the 38 series account for this percentage of the index figure) in 1935–39 are production series in their original state. Another 19 with a weight of 11.3 per cent in 1935–39 also report production, but are partly estimated; in most instances, so as to conform to Census of Manufactures data. The remaining series do not report production as such, but other activities supposed to reflect production. Among these are 8 man-hour series, with a weight of 27.6 per cent in 1935–39, adjusted by smooth interpolated values that allegedly reflect changes in man-hour productivity.

The representation of man-hour series was increased in revisions of the index published in the *Federal Reserve Bulletin*, Sept. 1941 and Oct. 1943. Of late the effective weight of the man-hour series has increased by leaps and bounds, partly because of their increased number, partly because these series predominantly represent war industries. In June 1943 the man-hour series accounted for 58 per cent of the total index of industrial production, and for a still larger percentage of its manufactures component (*ibid.*, Oct. 1943, p. 949).

TABLE 15

Dates of Cyclical Peaks and Troughs
Successive Versions of Three Indexes of 'Industrial Production'
United States, 1919–1938

Cyclical turn[a]	Federal Reserve Board index[b]			Standard Statistics Co. index[c]			Federal Reserve Bank of New York index[d]		
	A	B	C	A[e]	B	C	A[e]	B[e]	C[e]
T	June 1919	Mar. 1919	....	June 1919	May 1919	May 1919	Mar. 1919	Mar. 1919	Mar. 1919
P	Jan. 1920	Feb. 1920	....	Jan. 1920	Mar. 1920	Feb. 1920	Jan. 1920	Jan. 1920	Jan. 1920
T	July 1921	Apr. 1921	....	July 1921	Apr. 1921	Mar. 1921	Jan. 1921	Mar. 1921	Mar. 1921
P	May 1923	June 1923	May 1923	May 1923	May 1923	May 1923	Feb. 1924	Apr. 1923	May 1923
T	Aug. 1924	July 1924	July 1924	June 1924	June 1924	July 1924	July 1924	July 1924	July 1924
P	....	Oct. 1926	Mar. 1927	....	Sep. 1926	Sep. 1926	....	Dec. 1925	Dec. 1925
T	....	Nov. 1927	Nov. 1927	....	Dec. 1927	Nov. 1927	....	Dec. 1927	Dec. 1927
P	....	June 1929	Aug. 1929	....	May 1929	June 1929	....	June 1929	Aug. 1929
T	....	July 1932	July 1932	....	....	Mar. 1933	....	Mar. 1933	Mar. 1933
P	....	Dec. 1936	May 1937	....	....	Mar. 1937	....	Dec. 1936	Dec. 1936
T	....	May 1938	May 1938	....	....	Apr. 1938	....	....	May 1938

All indexes are seasonally adjusted.

[a] T stands for trough, P for peak. When a cylical movement culminates in two or more identical values, the latest month was taken as the date of turn.

[b] For index A, see *Federal Reserve Bulletin*, May 1924–Jan. 1927; index B, Board of Governors of the Federal Reserve System, *Annual Report* for 1937, pp. 173-9, and *Federal Reserve Bulletin*, Oct. 1938, p. 910; index C, *ibid.*, Aug. 1940, p. 825. Slight revisions in the latter index (*ibid.*, Sept. 1941, p. 934) shifted the trough from May to June 1938, but left the other cyclical turns unchanged.

[c] See the following publications of the Standard Statistics Company: for index A, *Standard Daily Trade Service: Annual Statistical Bulletin*, 1926, pp. 32-6; index B, *Standard Trade and Securities: Base Book, Standard Statistical Bulletin*, Jan. 1932, p. 159; index C, *Standard Trade and Securities: Basic Statistics*, April 29, 1938, Sec. D, p. 67, and later issues (title changes).

[d] For index A, see the series on 'productive activity' in Carl Snyder, The Revised Index of the Volume of Trade, *Journal of the American Statistical Association*, Sept. 1925. Indexes B and C were obtained directly from the Federal Reserve Bank of New York. For a description of B, see *ibid.*, Dec. 1931, p. 436 ff; for a description of C, *ibid.*, June 1938, p. 341 ff. Cf. *ibid.*, Dec. 1923, p. 949 ff; June 1928, p. 154 ff; Sept. 1941, p. 423 ff.

[e] Adjusted for secular trend as well as seasonal variations.

tries. But the only series of this type that warrant consideration for setting a reference scale of business cycles are bank clearings, indexes of wholesale prices, open-market interest rates, and indexes of business conditions. Our experience with American data indicates that none of these records, by itself, is a satisfactory gauge of business cycles. Bank clearings, even if limited to cities outside New York, give excessive weight at times to financial transactions. The addition of new cities complicates the interpretation of the figures in the early decades. The increasing reliance upon checks [19] as an instrument of payment is a more serious factor, since checks have come to be used more and more in relatively stable transactions, such as paying salaries, rents, and trading at retail. Indexes of wholesale prices have served more faithfully as 'barometers' of business cycles than many students now believe. It is true, nevertheless, that wholesale prices and the physical volume of business activity have sometimes followed divergent paths for months at a time, as during 1926–29 and 1938–39. Nor can open-market commercial paper rates be trusted implicitly as a criterion for dating business cycles. The substantial business cycle from

[19] That has been the broad secular tendency, at least to 1930.

1933 to 1938 made hardly a ripple in short-term interest rates. At other times short-term interest rates have traced out specific cycles which reflected disturbances confined largely to the financial markets, as during the depression of the 1870's. Indexes of business conditions should be free from the vagaries that mark the cyclical course of individual series; but before the 1890's these composites are made from exceedingly inadequate data. We believe that with the exception of open-market interest rates, foreign records of these various types are, if anything, even less satisfactory than the American.

The conclusion to be drawn from this condensed review of statistical data bearing on aggregate economic activity is obvious. If there is no monthly or quarterly series in any of our countries that can serve by itself as a criterion for setting a reference scale of business cycles, whether because the series is not long enough, or not accurate enough, or not broad enough in its coverage, or not stable enough in its relation to business cycles, or for all these reasons, then it is necessary to use a more laborious method; that is, a reference scale of business cycles must be extracted from the fallible indications provided by time series for varied economic activities. In using this method there is, of course, considerable leeway in the range of data, as well as in the choice of specific techniques. In view of our aims at the start of this investigation, it was not worth while to use time-consuming statistical methods. Hence we followed a simple procedure, which cannot lay claim to elegance or to a high degree of precision, but which at least promised more trustworthy results than did any single statistical series.

IV A Tentative Schedule of Reference Dates

Here, as elsewhere, our working definition of business cycles served as a guidepost. According to this definition, no fluctuation in activity qualifies as a business cycle unless it spreads over many of the economic processes of a country. Descriptive evidence concerning the generality of past fluctuations is provided by *Business Annals,* compiled by Willard Thorp and published by the National Bureau in 1926.[20] Our first step toward identifying business cycles was to identify the turns of general business activity indicated by these annals. Next, the evidence of the annals was checked against indexes of business conditions and other series of broad coverage. In most cases these varied records pointed clearly to some one year as the time when a cyclical turn occurred. When there was conflict of evidence, additional statistical series were examined and historical accounts of business conditions consulted, until we felt it safe to write down an interval

20 For a continuation of these annals through 1931, see W. L. Thorp, The Depression as Depicted by Business Annals (National Bureau of Economic Research, *News-Bulletin No. 43,* Sept. 19, 1932).

within which a cyclical turn in general business probably occurred. We then proceeded to refine the approximate dates by arraying the cyclical turns in the more important monthly or quarterly series we had for the time and country.

But the outstanding fact about economic time series is wide variation in their behavior traits. It would not do merely to mark off the zone within which a succession of series reached (say) cyclical peaks, then choose the month of their central tendency as the reference peak. (1) Some series 'indicate' a decline in business activity when they rise and an increase when they fall; for example, bankruptcies, unemployment, idle equipment. Their peaks and troughs must be inverted before casting up the evidence. (2) Some series regularly reach their peaks and troughs within the intervals marked by concentrations of turning dates. Others behave erratically. In setting reference dates, the evidence of a series that always or usually keeps in step with others is more significant than that of a series that usually 'walks by itself'. (3) Of the series that fluctuate in unison, some are early to rise and early to fall; others are laggards; a few lead at one turn and lag at the other; many exhibit no consistent timing. These timing characteristics must be taken into account in fixing reference turns. (4) So also must the secular trends of the series. That electric power production in the United States rose from 1924 to 1929 is not good evidence that there was no business-cycle contraction in 1926–27; for during these years the use of electricity was growing so fast that a mild contraction in general business might merely retard its rise. (5) Erratic movements must be taken into account because, when large in proportion to cyclical fluctuations, they cast doubt on the dates chosen to represent specific-cycle turns. (6) These dates may be dubious also because the amplitudes of specific-cycle expansions and contractions are slight. (7) Finally, it is essential to recognize that the relative importance of the economic activities represented may vary considerably from period to period for the same series, as well as from series to series for the same period.

Thus, to ascertain a business-cycle turn from an array of specific-cycle turns, one needs to know a great deal about the individual series. When we first made a reference scale of business cycles, we had to rely on vague knowledge concerning the cyclical behavior and the economic significance of different series. Under the circumstances, it seemed pointless to assign formal weights to the turning dates of individual series. A judgment as to a reference turn was based on a study of whatever evidence had been marshaled, without the aid of any 'objective' statistical controls. In many cases the turning points of different series were bunched so closely that we could not go far astray. But there were cases in which the turning points were widely scattered, and others in which they were concentrated around two separate dates. If there was little else to guide

TABLE 16

Reference Dates and Durations of Business Cycles in Four Countries

Line	Monthly reference dates		Duration in months			Quarterly reference dates		Calendar-year reference dates		Fiscal-year[a] reference dates	
	Peak	Trough	Expansion[a]	Contraction[b]	Full cycle	Peak	Trough	Peak	Trough	Peak	Trough
						United States					
1	...	...	..	..	..	...	...	...	1834	...	...
2	...	...	..	..	..	...	...	1836	1838	...	...
3	...	...	..	..	..	...	...	1839	1843	...	...
4	...	...	..	..	..	...	...	1845	1846	...	...
5	...	...	..	..	..	...	...	1847	1848	...	...
6	...	Dec. 1854	..	..	..	...	4Q 1854	1853	1855	...	...
7	June 1857	Dec. 1858	30	18	48	2Q 1857	4Q 1858	1856	1858	...	...
8	Oct. 1860	June 1861	22	8	30	3Q 1860	3Q 1861	1860	1861	...	...
9	Apr. 1865	Dec. 1867	46	32	78	1Q 1865	1Q 1868	1864	1867	...	1868
10	June 1869	Dec. 1870	18	18	36	2Q 1869	4Q 1870	1869	1870	1869	1871
11	Oct. 1873	Mar. 1879	34	65	99	3Q 1873	1Q 1879	1873	1878	1873	1878
12	Mar. 1882	May 1885	36	38	74	1Q 1882	2Q 1885	1882	1885	1882	1885
13	Mar. 1887	Apr. 1888	22	13	35	2Q 1887	1Q 1888	1887	1888	1887	1888
14	July 1890	May 1891	27	10	37	3Q 1890	2Q 1891	1890	1891	1890	1891
15	Jan. 1893	June 1894	20	17	37	1Q 1893	2Q 1894	1892	1894	1893	1894
16	Dec. 1895	June 1897	18	18	36	4Q 1895	2Q 1897	1895	1896	1896	1897
17	June 1899	Dec. 1900	24	18	42	3Q 1899	4Q 1900	1899	1900	1900	1901
18	Sep. 1902	Aug. 1904	21	23	44	4Q 1902	3Q 1904	1903	1904	1903	1904
19	May 1907	June 1908	33	13	46	2Q 1907	2Q 1908	1907	1908	1907	1908
20	Jan. 1910	Jan. 1912	19	24	43	1Q 1910	4Q 1911	1910	1911	1910	1911
21	Jan. 1913	Dec. 1914	12	23	35	1Q 1913	4Q 1914	1913	1914	1913	1915
22	Aug. 1918	Apr. 1919	44	8	52	3Q 1918	2Q 1919	1918	1919	1918	1919
23	Jan. 1920	Sep. 1921	9	20	29	1Q 1920	3Q 1921	1920	1921	1920	1922
24	May 1923	July 1924	20	14	34	2Q 1923	3Q 1924	1923	1924	1923	1924
25	Oct. 1926	Dec. 1927	27	14	41	3Q 1926	4Q 1927	1926	1927	1927	1928
26	June 1929	Mar. 1933	18	45	63	2Q 1929	1Q 1933	1929	1932	1929	1933
27	May 1937	May 1938	50	12	62	2Q 1937	2Q 1938	1937	1938	1937	1939
						France					
1	...	...	..	..	..	...	...	...	1840	...	...
2	...	...	..	..	..	...	...	1847	1849	...	...
3	...	...	..	..	..	..	...	1853	1854	...	...
4	...	...	..	..	..	...	...	1857	1858	...	...
5	...	Dec. 1865	..	..	..	...	...	1864	1865	...	...
6	Nov. 1867	Oct. 1868	23	11	34	...	...	1866	1868	...	...
7	Aug. 1870	Feb. 1872	22	18	40	...	...	1869	1871	...	...
8	Sep. 1873	Aug. 1876	19	35	54	...	...	1873	1876	...	...
9	Apr. 1878	Sep. 1879	20	17	37	...	...	1878	1879	...	...
10	Dec. 1881	Aug. 1887	27	68	95	...	...	1882	1887	...	...
11	Jan. 1891	Jan. 1895	41	48	89	...	1Q 1895	1890	1894	...	...
12	Mar. 1900	Sep. 1902	62	30	92	1Q 1900	3Q 1902	1900	1902	...	...
13	May 1903	Oct. 1904	8	17	25	2Q 1903	3Q 1904	1903	1904	...	...
14	July 1907	Feb. 1909	33	19	52	3Q 1907	1Q 1909	1907	1908	...	...
15	June 1913	Aug. 1914	52	14	66	3Q 1913	3Q 1914	1913	1914	...	...
16	June 1918	Apr. 1919	46	10	56	2Q 1918	2Q 1919	1917	1918	...	...
17	Sep. 1920	July 1921	17	10	27	3Q 1920	3Q 1921	1920	1921	...	...
18	Oct. 1924	June 1925	39	8	47	3Q 1924	3Q 1925	1924	1925	...	...
19	Oct. 1926	June 1927	16	8	24	3Q 1926	3Q 1927	1926	1927	...	...
20	Mar. 1930	July 1932	33	28	61	1Q 1930	3Q 1932	1930	1932	...	...
21	July 1933	Apr. 1935	12	21	33	3Q 1933	1Q 1935	1933	1935	...	...
22	June 1937	Aug. 1938	26	14	40	2Q 1937	3Q 1938	1937	1938	...	...

TABLE 16—*Continued*

Reference Dates and Durations of Business Cycles in Four Countries

Line	Monthly reference dates		Duration in months			Quarterly reference dates		Calendar-year reference dates		Fiscal-year[c] reference dates	
	Peak	Trough	Expansion[a]	Contraction[b]	Full cycle	Peak	Trough	Peak	Trough	Peak	Trough
					Great Britain						
1	...	...	..	..	..	...	...	1792	1793	...	...
2	...	...	..	..	..	...	...	1796	1797	...	...
3	...	...	..	..	..	...	...	1802	1803	...	...
4	...	...	..	..	..	...	...	1806	1808	...	...
5	...	...	..	..	..	...	...	1810	1811	...	...
6	...	...	..	..	..	...	...	1815	1816	...	...
7	...	...	..	..	..	...	...	1818	1819	...	...
8	...	...	..	..	..	...	...	1825	1826	...	...
9	...	...	..	..	..	...	...	1828	1829	...	...
10	...	...	..	..	..	...	..	1831	1832	...	...
11	...	...	..	..	..	...	...	1836	1837	...	...
12	...	...	..	..	..	...	...	1839	1842	...	...
13	...	...	..	..	..	...	...	1845	1848	...	...
14	...	Dec. 1854	..	..	..	...	1Q 1855	1854	1855	...	...
15	Sep. 1857	Mar. 1858	33	6	39	4Q 1857	1Q 1858	1857	1858	...	...
16	Sep. 1860	Dec. 1862	30	27	57	4Q 1860	4Q 1862	1860	1862	...	...
17	Mar. 1866	Mar. 1868	39	24	63	2Q 1866	2Q 1868	1866	1868	...	...
18	Sep. 1872	June 1879	54	81	135	4Q 1872	2Q 1879	1873	1879	...	...
19	Dec. 1882	June 1886	42	42	84	1Q 1883	2Q 1886	1883	1886	...	...
20	Sep. 1890	Feb. 1895	51	53	104	3Q 1890	1Q 1895	1890	1894	...	...
21	June 1900	Sep. 1901	64	15	79	2Q 1900	4Q 1901	1900	1901	...	...
22	June 1903	Nov. 1904	21	17	38	2Q 1903	4Q 1904	1903	1904	...	...
23	June 1907	Nov. 1908	31	17	48	2Q 1907	4Q 1908	1907	1908	...	...
24	Dec. 1912	Sep. 1914	49	21	70	1Q 1913	3Q 1914	1913	1914	...	...
25	Oct. 1918	Apr. 1919	49	6	55	3Q 1918	2Q 1919	1917	1919	...	...
26	Mar. 1920	June 1921	11	15	26	2Q 1920	2Q 1921	1920	1921	...	...
27	Nov. 1924	July 1926	41	20	61	4Q 1924	3Q 1926	1924	1926	...	...
28	Mar. 1927	Sep. 1928	8	18	26	2Q 1927	3Q 1928	1927	1928	...	...
29	July 1929	Aug. 1932	10	37	47	3Q 1929	3Q 1932	1929	1932	...	...
30	Sep. 1937	Sep. 1938	61	12	73	3Q 1937	3Q 1938	1937	1938	...	...
					Germany						
1	...	...	..	..	..	...	...	...	1866	...	...
2	...	...	..	..	..	...	...	1869	1870	...	...
3	...	Feb. 1879	..	..	..	...	1Q 1879	1872	1878	...	...
4	Jan. 1882	Aug. 1886	35	55	90	1Q 1882	3Q 1886	1882	1886	...	...
5	Jan. 1890	Feb. 1895	41	61	102	1Q 1890	1Q 1895	1890	1894	...	...
6	Mar. 1900	Mar. 1902	61	24	85	2Q 1900	1Q 1902	1900	1902	...	...
7	Aug. 1903	Feb. 1905	17	18	35	3Q 1903	1Q 1905	1903	1904	...	...
8	July 1907	Dec. 1908	29	17	46	2Q 1907	4Q 1908	1907	1908	...	...
9	Apr. 1913	Aug. 1914	52	16	68	1Q 1913	3Q 1914	1913	1914	...	...
10	June 1918	June 1919	46	12	58	2Q 1918	2Q 1919	1917	1919	...	...
11	May 1922	Nov. 1923	35	18	53	2Q 1922	4Q 1923	1922	1923	...	...
12	Mar. 1925	Mar. 1926	16	12	28	2Q 1925	2Q 1926	1925	1926	...	...
13	Apr. 1929	Aug. 1932	37	40	77	2Q 1929	3Q 1932	1929	1932	...	...

[a] From trough on preceding line to peak.
[b] From peak to trough on same line.
[c] That is, years ending June 30.

us, we placed the reference turn toward the close of the transition period.

The reference dates derived in this rough fashion have been subjected to continual tests, as new series have been studied and old ones restudied. If only a few specific-cycle turns occurred near one of our experimental reference dates, we questioned the existence of a business-cycle turn at that time, reexamined what evidence we had, and sought more. If most of the specific-cycle turns in the vicinity of a reference date came months before that date, we concluded that it had been put too late. After extensive testing on this plan, which necessitated various revisions, we obtained several years ago a reference scale that seemed to fit the specific-cycle movements tolerably well in most instances. This reference scale is still tentative, and will be reviewed thoroughly in the course of future work.

Table 16 presents the reference scale in its present stage of development for the United States, Great Britain, Germany and France.[21] In analyzing monthly series we need the reference dates by months, as is explained fully in Chapter 5. The quarterly reference dates are needed in handling quarterly series, and the annual reference dates in handling annual series. The fiscal-year reference dates are designed to facilitate analysis of some important American records available only by years ending June 30. In each country the annual reference scale covers more cycles than the monthly or quarterly, because annual series extend furthest into the past. But the reference scale by fiscal years is carried back no further than is necessary to analyze the series in our collection that come in this form. A like reason accounts for the relatively brief quarterly reference scale for France.

The monthly reference dates are basic. They alone enable us to observe cyclical behavior in the detail we consider essential.[22] They therefore control the quarterly and annual reference dates. The quarterly dates are virtually derived from the monthly. When the monthly reference date (peak or trough) occurs in the middle of a quarter (February, May, August, or November), we took that quarter as the date of the reference turn. When it occurs in the first month of a quarter, we placed the quarterly turn either in that quarter or in the one just preceding, according to the indications of a sample of important statistical series by quarters. Similarly, when the monthly reference date occurs in the last month of a quarter, we placed the quarterly turn in that quarter or in the one just following.

The annual reference dates have also been set to correspond with the monthly dates, although some mild and short business cycles are obscured

21 Simon Kuznets took a leading part in the preparation of the original set of reference dates. For aid in extending, revising or criticizing the dates, we are indebted to Isaiah Frank, George Garvy, and Walt Rostow; and especially Moses Abramovitz, Cicely Applebaum, Geoffrey H. Moore, Julius Shiskin, and Albert Wohlstetter.

22 Quarterly records, however, are often a satisfactory substitute. For an analysis of the influence of the time unit on cyclical measures, see Ch. 6.

in annual records.[23] The annual reference turn often comes in a year other than that of the monthly turn. The reason is that the annual reference dates purport to state the years in which general business reached a high or low point when comparisons are made by full years; these need not be the same as the years in which business activity on a monthly basis made cyclical turns.

Since our reference dates delimit only expansions and contractions, we may, and often do, speak of business cycles as if they consisted of only two phases. But our working definition of business cycles presents each of them as passing through four phases: expansion, recession, contraction, and revival. The most important practical and the most difficult theoretical problems presented by business cycles do not lie in the processes by which expansions and contractions develop after they have started; they lie in processes by which an expansion is succeeded by a recession and a contraction by a revival. Since a definition designed to guide an investigation should focus attention upon matters that require attention, we include in our definition the transitional phases of which we must later give an account.

V Difficulties in Setting Reference Dates Illustrated

The critical difficulty in setting reference dates is the uneven range and quality of statistical records for different periods and countries. In the United States monthly data are more abundant than in foreign countries. In each country they are more abundant since 1900, and especially since 1919, than in the nineteenth century. For example, in setting the reference dates for France in the 1860's, we were able to utilize a fairly large number of annual series. Our monthly records for this period, however, were limited to open-market interest rates and several series representing activities of the Bank of France. Even in the United States the number of monthly or quarterly series available for the early decades of the chronology is relatively small, as Table 17 indicates.[24] It is obvious, therefore, that the difficulty of setting reference dates, especially if they are expressed by months, must increase, and their reliability diminish, as the chronology is pushed back into the past.

Given the range of available records and the fineness of the time unit in which the reference scale is to be expressed, the ease or difficulty of

[23] Independent dating of annual reference scales would probably yield fewer cycles. Our reasons for forcing the annual chronology to correspond with the monthly are explained on p. 262. In the periods not covered by the monthly scales, the annual reference dates are of necessity independent.

[24] When the present reference scale was developed, the number of series in our collection was much smaller than in the table. Even as it stands, the list in 1860 is dominated by financial and price series. The production group in that year includes only three monthly series: hog receipts in Chicago, cattle receipts in Chicago, boot and shoe shipments from Boston. These activities are of slight value in fixing a reference scale of business cycles.

TABLE 17

Number of Monthly or Quarterly American Series Available at Decennial Dates since 1860

(Series analyzed by July 1, 1942)

Process	Number of series in our collection for							
	1860	*1870*	*1880*	*1890*	*1900*	*1910*	*1920*	*1930*
Production	3	7	13	15	23	29	133	154
Construction	..	1	2	1	1	8	78	81
Transportation	..	4	4	9	13	17	28	29
Commodity prices	8	11	13	66	76	86	141	143
Inventories	..	1	2	3	6	7	50	61
Merchandising	..	4	4	4	4	6	38	32
Foreign trade	..	7	7	7	8	19	19	19
Personal incomes	..	..	1	2	2	6	86	91
Profits and losses	..	..	2	5	9	11	16	22
Savings and investments	..	1	1	1	1	4	15	16
Security markets	2	2	4	7	8	10	9	6
Interest rates	4	4	5	6	11	11	20	24
Money and banking*	..	6	35	59	59	59	16	16
Aggregate transactions	2	2	11	12	13	13	16	16
Total	19	50	104	197	234	286	665	710

See note to Table 2.

*The drop in 1920 and 1930 is explained by the fact that statistics on the condition of the national banks have been analyzed thus far only through 1914.

setting reference dates depends on the nature of the fluctuations found in different activities and their interrelations. The range and quality of the statistical data for the United States since 1929 surpass anything we have for other countries or periods. Some uncertainty nevertheless surrounds the setting of monthly reference dates in this period. Readers unfamiliar with the complex behavior of economic time series are invited to study Chart 8, both for its own sake and for the illustrations it affords of the practical problems encountered in marking off the turning points of business cycles. The chart exhibits the movements of 40 significant monthly series, each of rather broad coverage,[25] during 1932–39.

The first feature to notice is that business activity fell to a deep trough in the summer of 1932, revived in the autumn, slumped again at the end of the year, and reached a new trough in the spring of 1933. The 'double bottom' appears in most series. Of the two troughs, that in the summer of 1932 is lower in the Federal Reserve Board index of production and in several other series. But a great majority of the series show a lower trough in the spring of 1933. This fact, reinforced by our general rule to accept a later date in cases of doubt, led us to date the trough in March 1933. We believe that the evidence favors this date rather than June or July 1932, whether a business-cycle trough is considered as a turn in aggregate activity, defined in some plausible fashion, or as the central tendency in the turning dates of leading branches of activity.[26] True, the

[25] Except commercial paper rates.

[26] See Tables 14-15 above; also our *Bulletin 61*, pp. 2-4.

Federal Reserve index of production reached a minimum in July 1932. But an enterprising investigator who sought to date business cycles according to the cyclical turns in physical production would begin, not stop, with that index. Noting the slight difference between its values in July 1932 and March 1933, the roughness of many of the underlying series and of their adjustment for seasonal variations, the limited industrial coverage of the index, and the different showing of other production indexes; he would want to examine many series, of the sort depicted in Chart 8, for the light they throw indirectly on the physical volume of production. In the end he would probably, though by no means certainly, pick March 1933 as the trough date.

When the cyclical turns of leading branches of economic activity are sharply angular and closely bunched, as in the second quarter of 1938 in the United States, a cyclical turn in general business activity can be dated with considerable assurance. In such a case minor errors in the original data, in the adjustments for seasonal variations, or in the dates assigned to the turns of the specific cycles, are likely to have slight influence on the final judgment. But when the turns in leading activities are comparatively 'flat', crisscrossed by erratic movements, and dispersed over many months, the turn in general business activity becomes elusive. The American business-cycle peak of 1937 approximates this type. To fix the month of this peak, a wide range of evidence, or at least a variety of independent measures or indicators of aggregate activity, is essential, no matter what theoretical criterion or criteria of a business-cycle turn an investigator may set in advance. Tables 18 and 19 summarize a few of the contrasts revealed by Chart 8 between the business-cycle peak in 1937 and the trough in 1938. Table 18 shows that erratic movements in a sample of 23 series on the volume of business activity are more prominent in the vicinity of the 1937 turn than of the 1938 turn; also that the figures reached at the turns are nearly duplicated in more months in the vicinity of the former turn than in the vicinity of the latter. Table 19 shows that the peaks reached in 1937 or thereabouts by our full sample of 40 series are widely dispersed, whereas the troughs are sharply concentrated: 27 series reach a trough in the interval from April to June 1938.[27] In view of unavoidable errors in the data and in the dates assigned to the specific-cycle

[27] Tables 14-15 supply further contrasts between the business-cycle turns in 1937 and 1938; also between the trough in 1924, which resembles that of 1938, and the peak in 1926, which bears some resemblance to that of 1937. Table 14 indicates that the cyclical turns of employment series are bunched more closely in 1924 than in 1926, and in 1938 than in 1937. Table 15 shows that the divergence among the cyclical turns of different measures of industrial production is at a maximum in 1926, considerable in 1937, but slight in 1924 and 1938.

It may be noted parenthetically that this evidence, so far as it goes, gives no support to J. M. Keynes' thesis that "the substitution of a downward for an upward tendency often takes place suddenly and violently, whereas there is, as a rule, no such sharp turning-point when an upward is substituted for a downward tendency." (*The General Theory of Employment, Interest and Money*, Harcourt, Brace and Co., 1936, p. 314.)

CHART 8

Behavior of Forty American Series, 1932 – 1939

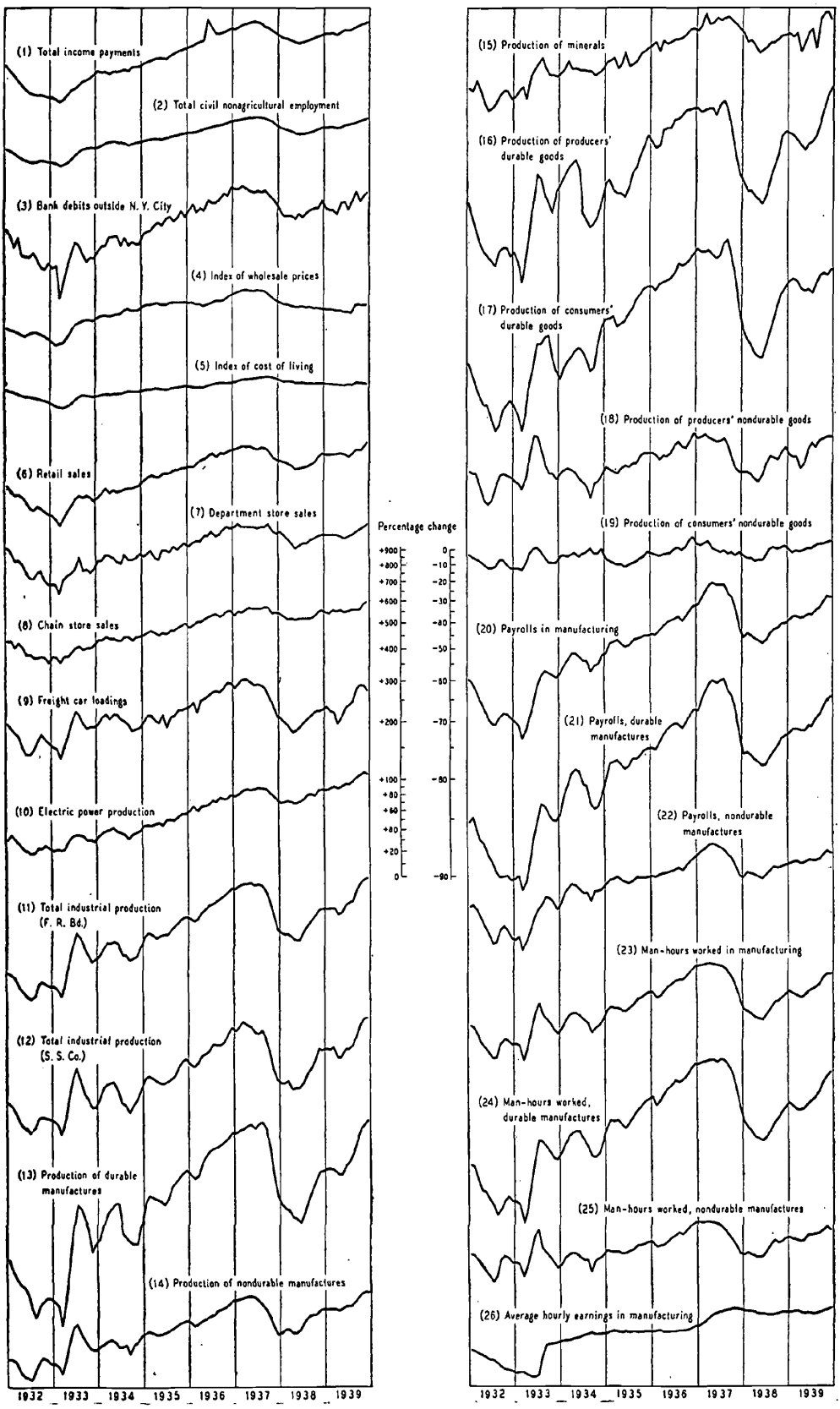
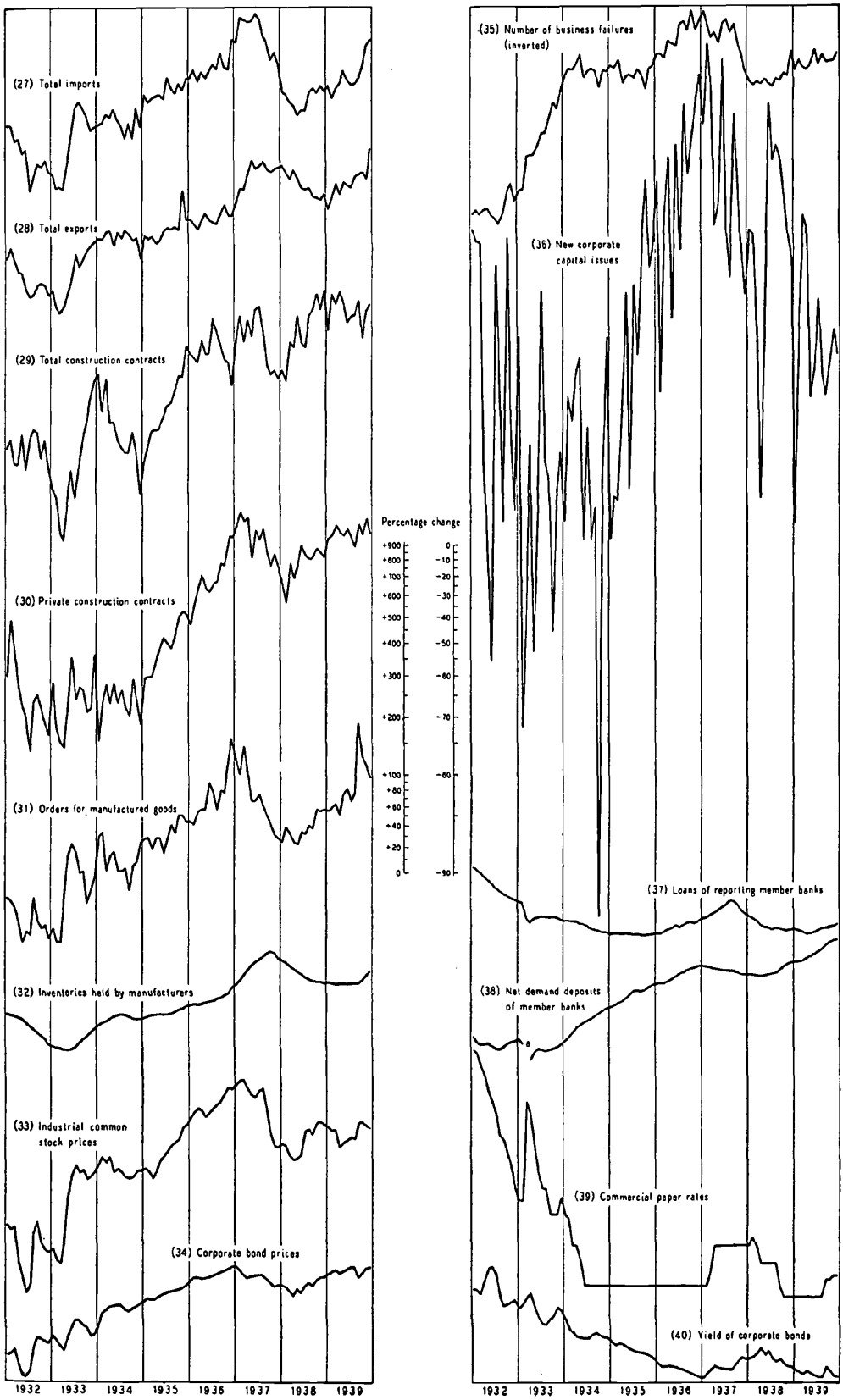


CHART 8 (CONTINUED)



For sources of data and other notes, see Appendix C.

[a] No data, March 1933.

TABLE 18

Short-term Fluctuations around the Cyclical Turns of 1937 and 1938
23 American Series

No.[a]	Series	In an interval of eleven months centered on the cyclical turn							
		No. of months that are within 1% of the value at the turn[b]				No. of reversals in direction[c]			
		Specific-cycle		Reference		Specific-cycle		Reference	
		Peak[d]	Trough[d]	Peak (May 1937)	Trough (May 1938)	Peak[d]	Trough[d]	Peak (May 1937)	Trough (May 1938)
	PRODUCTION								
11	Total industrial (F.R.Bd.)	3	1	6	3	3	1	3	1
12	Total industrial (S.S.Co.)	..	2	3	3	4	3	4	3
13	Durable manufactures	1	..	1	1	3	1	3	1
14	Nondurable manufactures	3	..	4	3	1	2	1	2
16	Producers' durable goods	..	..	3	1	3	1	4	1
17	Consumers' durable goods	..	1	4	2	2	1	5	1
18	Producers' nondurable goods	1	..	6	1	5	2	4	2
19	Consumers' nondurable goods	..	..	1	3	5	2	5	2
15	Minerals	2	..	3	1	3	3	6	3
10	Electric power	4	3	7	5	3	4	4	4
9	Freight car loadings	1	..	3	1	4	1	4	1
	DOMESTIC TRADE								
3	Bank debits outside N.Y.City	1	1	7	3	6	3	6	3
6	Retail sales	3	2	7	4	5	1	5	1
7	Department store sales	..	..	7	1	4	2	2	2
8	Chain store sales	5	6	8	7	4	3	5	3
	EMPLOYMENT								
2	Nonagricultural employment	4	3	8	5	1	1	1	1
23	Man-hours, manufacturing	2	2	6	3	1	1	1	1
24	Man-hours, durable manufactures	3	..	6	2	3	1	4	1
25	Man-hours, nondurable manufactures	4	2	7	3	4	4	3	4
	FLOW OF INCOMES								
1	Total income payments	3	2	5	5	1	1	2	1
20	Payrolls, manufacturing	..	..	5	2	1	2	1	3
21	Payrolls, durable manufactures	..	1	2	1	3	2	4	3
22	Payrolls, nondurable manufactures	2	1	3	3	1	4	1	4
	Total	42	27	112	63	70	46	78	48
	Comparison between peaks and troughs								
	No. of series in which entry at peak								
	Exceeds entry at trough	13		18		14		15	
	Is exceeded by entry at trough	4		1		4		4	
	Equals entry at trough	6		4		5		4	

[a] The series are numbered as in Chart 8. For sources of data and other notes, see Appendix C.

[b] In the case of reference turns, the average value in the three months centered on the turn was treated as the value at the turn. In the case of specific-cycle turns, the actual value in the month of turn was used. Hence the count is based on 10 months for specific-cycle turns, and 11 months for reference turns.

[c] Within an interval of 11 months, there are 10 observations on direction of movement and 9 on reversal of direction; hence the theoretical range is from 0 to 9. Horizontal movements are ignored in the tabulation. Another calculation made on the assumption that a first difference of zero is equally likely to be plus or minus in fact (excepting, of course, a series like commercial paper rates in recent years) did not change the results significantly; it is omitted for reasons of simplicity.

[d] The dates are listed in Table 19.

turns, there is a fair chance that the peak we have dated in May 1937 is misplaced by several months. But it seems rather unlikely from the present evidence that the trough dated in May 1938 can be in error by more than one month.

The series in Chart 8 are, of course, a sample drawn from a large 'parent population'. The sample rests on judgments that inevitably condition the reference dates. The present list is confined to series of rather broad significance. When the reference dates of 1937 and 1938 were originally set, another list was used, which included series on individual industries as well as broad composites. The change from one list to the other represents a shift in judgment on our part.[28] Even the series common to the two lists are in several instances common in name only. These differences arise from shifts in judgment on the part of the original compilers, who—contrary to widespread opinion—are not engaged simply in 'straight reporting'. To make progress, they experiment in handling their problems as we do in handling ours. When our work was first done, we chose May instead of June 1938 as the reference trough, largely because three of the most comprehensive aggregates at our disposal—the Federal Reserve index of industrial production, the Department of Commerce series on total income payments, and an unpublished index of consumer expenditures by the Federal Reserve Board—all showed a trough in May. Later revisions by the compilers shifted the trough in the production index to May and June, in income payments to June, and in the consumption index to July.[29] If we took up the problem of dating anew, we would set the reference trough in June instead of May 1938, whether relying on the series originally used or those in Chart 8.[30] But changes in the underlying sample of time series will not always be so neutral in their effect on a reference date; nor will revisions of the figures of the same series always have so slight an effect.

Chart 8 illustrates another difficulty in developing a reference scale of business cycles; namely, how to distinguish between fluctuations that are and those that are not 'business cycles'. In many branches of business the expansion from March 1933 to May 1937 was seriously interrupted from about July to November 1933 and again from about May to September 1934. So widespread were these reversals that they raise the question whether one or more 'extra' business cycles should not be recognized in this period. Several factors argue against such treatment. (1) Unlike past recoveries in this country, the recovery from the slump of 1929–32 was

28 Compare, for example, the series in Chart 8 with the list in our *Bulletin 61*, p. 3.

29 The index for consumption is not included in Chart 8, because of its uncertain dependability. We use instead a major component of the index: the total dollar value of retail sales (undeflated).

30 Hence this paradoxical result: despite the simplicity of dating the reference turn of 1938 compared with that of 1937, we seem to have erred by one month in dating the turn in 1938, while there is no clear evidence at present that the date of the peak set in May 1937 can be improved.

TABLE 19

Sequence of Cyclical Turns in the 1937 Recession and the 1938 Revival
40 American Series

Year & month	Specific-cycle peak	Year & month	Specific-cycle trough
1936			
Dec.	Production of producers' nondurable goods (18) Production of consumers' nondurable goods (19) Orders for manufactured goods (31)		
1937			
Jan.	Man-hours worked, nondurable manufactures (25) Corporate bond prices[a] (34) Number of business failures, *inverted*[b] (35) Net demand deposits of member banks (38)		
Feb.	Private construction contracts (30) New corporate capital issues (36)		
Mar.	Bank debits outside N.Y.City (3) Total industrial production, S.S.Co. (12) Industrial common stock prices (33)		
Apr.	Index of wholesale prices (4) Freight car loadings[a] (9) Man-hours worked in manufacturing (23)		
May	Retail sales[c] (6) Total industrial production, F.R.Bd. (11) Production of nondurable manufactures[a] (14) Payrolls in manufacturing (20) Payrolls, nondurable manufactures (22) Total exports (28)		
June	Total income payments[d] (1) Total imports (27)		
July	Total civil nonagricultural employment (2) Electric power production (10) Man-hours worked, durable manufactures (24) Total construction contracts (29)		
Aug.	Production of durable manufactures (13) Production of producers' durable goods (16) Payrolls, durable manufactures (21) Loans of reporting member banks (37)		
Sep.	Production of minerals[e] (15) Production of consumers' durable goods (17)		
Oct.	Index of cost of living[a] (5) Department store sales[f] (7) Chain store sales[g] (8) Average hourly earnings in manufacturing (26) Inventories held by manufacturers (32)		
		1937	
		Dec.	Production of nondurable manufactures (14)
1938		*1938*	
Feb.	Commercial paper rates (39)	Feb.	Total construction contracts (29) Private construction contracts (30)
Apr.	Yield of corporate bonds (40)	Apr.	Freight car loadings (9) Total industrial production, S.S.Co. (12) Production of consumers' nondurable goods (19) Industrial common stock prices(33) Corporate bond prices (34) Net demand deposits of member banks (38)
		May	Bank debits outside N.Y.City (3) Retail sales (6) Department store sales (7) Chain store sales[c] (8) Electric power production[h] (10) Production of minerals (15) Production of producers' nondurable goods (18) Man-hours worked, nondurable manufactures (25) Total imports (27) Orders for manufactured goods (31)

TABLE 19 — *Continued*

Sequence of Cyclical Turns in the 1937 Recession and the 1938 Revival
40 American Series

Year & month	Specific-cycle peak	Year & month	Specific-cycle trough
		June	Total income payments (1) Total civil nonagricultural employment (2) Total industrial production, F.R.Bd.[a] (11) Production of durable manufactures (13) Production of producers' durable goods (16) Production of consumers' durable goods[a] (17) Payrolls in manufacturing (20) Payrolls, durable manufactures (21) Payrolls, nondurable manufactures (22) Man-hours worked in manufacturing (23) Man-hours worked, durable manufactures (24)
		July	Number of business failures, *inverted* (35)
		Aug.	Average hourly earnings in manufacturing (26)
		1939 Jan.	Total exports (28)
		Apr.	Loans of reporting member banks (37)
		June	Index of cost of living (5) Inventories held by manufacturers (32)
		Aug.	Index of wholesale prices (4)
		Sep.	New corporate capital issues[i] (36)

In this table, as in Chart 8, the series on corporate bond prices is the same as corporate bond yields, except that it is inverted. There is no entry for commercial paper rates and bond yields at the trough; the lower turning points cannot be determined even now (spring 1943). See Appendix C for sources and other notes about the series, which are numbered as in Chart 8.

[a] The same value in the preceding month.
[b] A slightly higher value in Oct. 1936.
[c] The same value two months earlier.
[d] A higher value in June 1936 (payments to veterans).
[e] A higher value in March 1937.
[f] The same value in Feb. 1937.
[g] The same value in May and Sept. 1937.
[h] A slightly lower value in Jan. 1938.
[i] A lower value in April 1938, Jan. and May 1939, and June 1940.

subject to repeated political shocks. (2) Three of the most comprehensive aggregates of economic activity—total income payments, nonagricultural employment, retail sales—show little or no trace of the two sharp fluctuations evident in most production and employment series, the first fluctuation consisting of a rise and fall from about March to November 1933, the second from about November 1933 to September 1934. (3) These fluctuations are similar to that from about July 1932 to March 1933 and from about September 1934 to May 1935. It seems reasonable to treat all four on the same basis. (4) The duration of these fluctuations is well below the lower limit set by our working concept of business cycles. However interesting the short fluctuations may be, we cannot recognize them as business cycles without changing the object of our investigation.[31] (5) The mechanism of fluctuations lasting only a few months cannot be the same as that of fluctuations lasting several years. The transition from one phase of a business cycle to the next comes about gradually through a

[31] But it is important to keep in mind that general business activity is subject to interruptions in its march from a trough to a peak and from a peak to a trough. See Mitchell, *Business Cycles: The Problem and Its Setting*, pp. 329-30; and our *Bulletin 69*, pp. 6-7.

complicated set of cumulative changes in the relations among different factors in the economy. This process takes time.[32] We know, for example, that months elapse before a downturn in contracts for new factories is followed by a downturn in the construction work actually done, and that another few months must elapse before a downturn occurs in the new industrial facilities completed. (6) We may follow our rule governing durations and yet recognize a business cycle with a trough in March 1933, a peak approximately in May 1934, and a terminal trough approximately in September 1934. But this 'cycle' would violate another part of our definition: namely, that no cycle be divisible into shorter cycles with amplitudes approximating its own. Further, the contraction phase of this cycle would be only 4 months, distinctly shorter than any we have recognized.

These considerations seem to us to constitute a reasonably decisive argument against recognizing more than one business cycle in the United States from 1933 to 1938. The case in point is significant, however, because it draws attention to the vagueness of our definition of business cycles; which fails to set a lower limit on the amplitude of business cycles, or to limit the duration of their phases of expansion and contraction, or to specify how extensively a fluctuation must be diffused through the economy in order to rate as a business cycle. The lack of precision in our criteria of business cycles has proved troublesome in a few border-line cases. But so great is the variation in the quantity, quality and economic range of statistical records for different countries and periods, that our definition would not be so useful as a working tool if every element of vagueness in it were removed. Moreover, border-line cases are intrinsic in the historical process itself. Puzzling cases are likely to arise in practice, no matter how precisely the boundary line that sets off business cycles is drawn, or how reverently it is observed. The important thing, therefore, is to organize the statistical analysis on a plan that will force the border-line cases to the surface and thus permit revisions, if that should prove desirable. In the end our statistical analysis will accomplish this aim.

It may perhaps be helpful at this time to describe one puzzling case, and our reasons for treating it as we have. Readers familiar with the disturbed course of business during World War I may wonder why this period counts as an expansion in our reference chronology. Table 20 is not likely to dispel the doubts. In Great Britain and Germany, production of basic commodities dropped, as did employment. At the same time, the price level soared and unemployment practically disappeared. In the United States, production of basic commodities, viewed in the aggregate, changed little from our entry into the war until the Armistice; the same

[32] Note the long average leads or lags of some of the series tabulated in the source last cited.

TABLE 20

Production, Employment and Prices in Three Countries, 1914–1918

Series and country	Unit	1914	1915	1916	1917	1918
UNITED STATES						
(1) Industrial production...	Av. 1914=100	100	110	127	132	127
(2) Employment.....	Av. 1914=100	100	102	118	122	125
(3) Unemployment.....	Per cent	8.9	8.4	2.6	3.2	2.4
(4) Wholesale prices.....	Av. 1914=100	100	102	126	173	193
GREAT BRITAIN						
(5) Industrial production...	Av. 1914=100	100	101	93	90	85
(6) Employment.....	July 1914=100	100	92	93	92	91
(7) Unemployment.....	Per cent	4.2	1.3	0.6	0.7	0.8
(8) Wholesale prices.....	Av. 1914=100	100	127	160	206	226
GERMANY						
(9) Industrial production...	Av. 1914=100	100	82	77	75	69
(10) Employment.....	Av. 1914=100	100	81	81	84	84
(11) Unemployment.....	Per cent	7.1	3.4	2.3	1.0	1.0
(12) Wholesale prices.....	Av. 1914=100	100	135	145	170	207

The series are not closely comparable, but they probably suffice to indicate broad tendencies.

SOURCES:

(1) Geoffrey H. Moore, Production of Industrial Materials in World Wars I and II (National Bureau of Economic Research, *Occasional Paper 18*, March 1944), p. 5. (2) Factory employment in three states—New York, New Jersey and Massachusetts; estimated by H. Jerome, *Migration and Business Cycles* (National Bureau of Economic Research, 1926), p. 248. (3) Reported percentage of unemployed trade union members in Massachusetts. Department of Labor and Industries of Massachusetts, *Annual Report on the Statistics of Labor*, 1923, Part III, p. 20. Annual averages derived from 2-point moving averages of end-of-quarter figures. (4) Index of the Bureau of Labor Statistics; see its *Bulletin 493*, p. 9.

(5) W. Hoffmann, Ein Index der industriellen Produktion für Grossbritannien seit dem 18. Jahrhundert, *Weltwirtschaftliches Archiv*, Sept. 1934, p. 398. (6) Estimates of industrial employment (private concerns), for July. Ministry of Munitions, *History of the Ministry of Munitions*, Vol. VI, Part 4, pp. 23-9. (7) Percentage of insured work-people unemployed. Ministry of Labour, *Eighteenth Abstract of Labour Statistics of the United Kingdom*, 1926, p. 50. Annual averages derived from 2-point moving averages of end-of-month figures. Average for 1918 excludes December. (8) *The Statist*, Jubilee Section, June 1928, p. 134. (Series 5-7 for Great Britain include Ireland.)

(9) Rolf Wagenführ, Die Industriewirtschaft: Entwicklungstendenzen der deutschen und internationalen Industrieproduktion 1860 bis 1932 (Institut für Konjunkturforschung, *Vierteljahrshefte zur Konjunkturforschung*, Sonderheft 31), p. 23. (10) Estimates of industrial employment on the basis of accident insurance membership, by Albert Wohlstetter and Fred Lynn of the National Bureau staff. (11) Reported percentage of unemployed trade union members. *Reichsarbeitsblatt*, 1920, p. 25. Annual averages derived from 2-point moving averages of end-of-month figures. (12) Zahlen zur Geldentwertung in Deutschland 1914 bis 1923, *Wirtschaft und Statistik*, Sonderheft 1, 1925, p. 16.

seems to have been true of employment.[33] In each country the output of war industries rose; the output of consumer goods, especially of the durable type, slumped. A few of the sharp contrasts that developed in American industry and finance during our active participation in the War are depicted in Chart 9. The production of trucks rose rapidly; the production of pleasure cars and residential construction fell drastically. Wholesale prices rose vigorously, stock prices declined. Domestic trade rose in dollar value, exports fell a trifle. Security issues declined, also trading in outstanding shares; but the bond market was exceptionally active. On the face of the statistical record, there is little reason for regarding 1917 and 1918 in the United States, or 1914–18 in Great Britain and Germany, as characterized by 'cyclical expansion'.

33 See the study by Geoffrey H. Moore cited in the note to Table 20; also an expected publication by Albert Wohlstetter on German and British experience during World War I.

CHART 9

Behavior of Twenty-three American Series, 1914 – 1918

(A) Price or Value Series

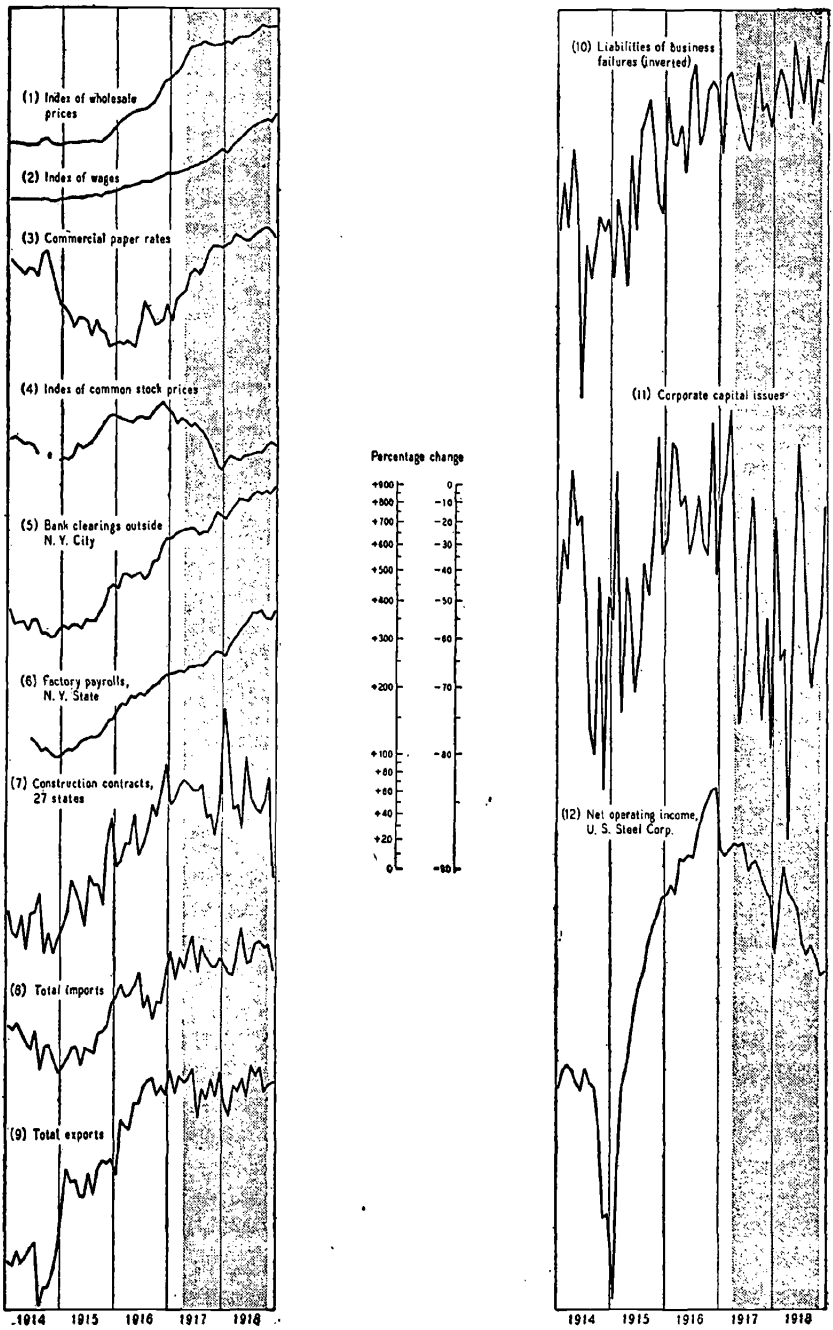
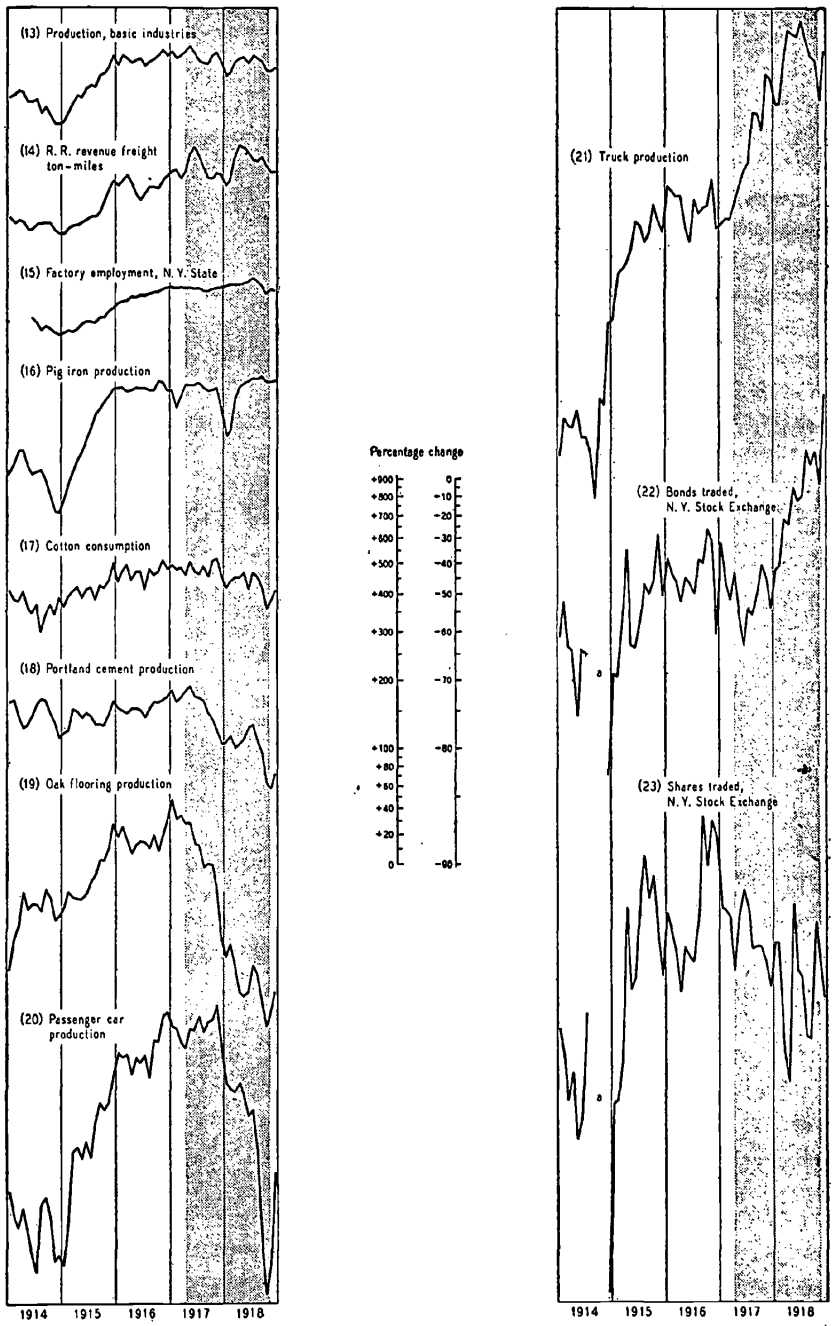


CHART 9 (CONTINUED)

(B) Physical Volume Series



Shaded areas cover period of American participation in World War I.
For sources of data and other notes, see Appendix C.

* N. Y. Stock Exchange closed Aug. – Nov. 1914.

However, the bare statistical record is somewhat misleading. If one country ceded part of its area to another, we would want to allow for the change in geographic coverage before pronouncing a judgment on the 'trend' of economic activity in either country. So too must we allow for the shrinkage in the economic sector of a nation's life during a major war, regardless of changes in its geographic area. In Great Britain and Germany a great part of the industrial manpower was diverted to the military forces. This loss was only partly made up by absorption of the unemployed, youths coming of industrial age, and accessions of men and women not normally in the labor force. A reduction in the efficiency of industrial labor probably accompanied the reduction in numbers. Similar factors were at work in the United States; though in view of our relatively brief participation in the war, their influence was much smaller. The virtual disappearance of 'unemployment' and the violent rise of commodity prices in 1916–18 testify to the terrific strain on such resources as were available to industry in each of our countries.[34] Rising money incomes, a relative decline in the output of consumer goods, and increasing inelasticity of supply of commodities are typical of cyclical expansions; these factors were merely magnified by the war.

The sharp divergence in the movements of different branches of production is admittedly troublesome from the viewpoint of our concept of business cycles. But there is only one feasible alternative to treating 1914–18 as a cyclical expansion, and that is to ignore it—a practice frequently followed by writers on business cycles. That solution would be proper if our aim were merely to explain the tendencies toward cyclical fluctuations generated by processes internal to the economy. But as said in Chapter 1, the task before this investigation is to explore the business cycles of history, however 'disturbed' or 'distorted' they may be by random factors. The inclusion of the period 1914–18 as well as other war 'expansions' in the analysis, if it accomplishes nothing else, at least makes it possible to compare peace and war expansions,[35] and thus to gain some insight into differences among business cycles.[36]

VI Dependability of the Reference Dates

As already explained, the reference dates purport to mark the culminations of the cyclical expansions and contractions in 'general business

[34] In France the index of wholesale prices (Statistique Générale) rose from 118 in 1914 to 392 in 1918. Regrettably, no other statistics, similar to those used in Table 20 for other countries, seem to be available for France.

[35] For a preliminary study, see Wesley C. Mitchell, Wartime 'Prosperity' and the Future (National Bureau of Economic Research, *Occasional Paper 9*, March 1943).

[36] Of course, so far as individual activities, such as governmental expenditures or commodity prices or shipbuilding, undergo fluctuations well outside the usual range, they cannot be included in average measures of cyclical behavior without prejudice to their representative value. In such cases, our practice is to omit the war and immediate post-war cycles from the averages. See pp. 381, 492.

activity'. If this concept is somewhat fuzzy, so must be our dating. Neater results could be attained by estimating the cyclical turns of a quantity corresponding to some precise concept of aggregate economic activity. But as we have shown, the existing records virtually rule out this course except for the most recent business cycles. Even in dating recent cycles the plan has limitations. No measure of aggregate activity now available can be trusted implicitly on matters of fine detail. An investigator bent on precision will therefore wish to examine other measures of the same quantity, whether made by the same compiler at different times or by different compilers; [37] also related series that reflect indirectly the behavior of the given quantity. In the end he might present estimates of the cyclical turning dates of, say, the volume of 'employment'; but the operations he will have performed may not be very different from ours. As long as statistical data remain in something like their present state, theoretically distinct methods of dating business cycles—each used in a thoughtful and discriminating fashion—are reasonably certain to merge in practice.

That is not to say that the reference dates must remain in their present stage of rough approximation. Most of them were originally fixed in something of a hurry; revisions have been confined mainly to large and conspicuous errors, and no revision has been made for several years.[38] Surely, the time is ripe for a thorough review that would take account of extensive new statistical materials, and of the knowledge gained about business cycles and the mechanics of setting reference dates since the present chronology was worked out. In the summer of 1941 we projected such a study. The plan was to explore further the methodological problem of dating business cycles,[39] to set reference dates by different methods, reconcile conflicts so far as possible,[40] and with the experience thus gained embark on a more ambitious undertaking—a reasoned history of business cycles. But this project had barely started when the investigators placed in charge were drawn into war work.

For the time being, therefore, we must put up with a reference scale that requires extensive reworking. For example, the American reference trough in 1938 seems predated one month,[41] the trough in 1927 seems

37 Progress in statistical records, as in other branches of life, is uneven. Despite the labor expended, revisions of statistical series are not always improvements.

38 Indeed, the monthly (but not the quarterly or annual) American reference dates through 1927 have been allowed to stand as published in 1929 in the National Bureau's *Recent Economic Changes in the United States*, Vol. II, p. 892.

39 Concerning techniques of ascertaining the consensus of cyclical turning points from a collection of time series, see Arthur F. Burns, *Production Trends in the United States since 1870*, pp. 182-96, and Edwin Frickey, *Economic Fluctuations in the United States*, Part II.

40 This may, of course, involve replacing some reference turning *points* by turning *zones*; which would force a modification of some features of our technique. Cf. p. 148.

41 See above, p. 87.

postdated one month,[42] the trough in 1921 is probably postdated several months, and the peak in 1899 predated several months. Revision is certain to shift many reference dates by a month or two or three; some may be shifted six months or a year. Even after the revisions have been carried through, the reference dates will still vary in dependability. Estimates of turning points of business cycles cannot transcend the raw materials on which they are based; hence, annual reference dates are and will continue to be more dependable than monthly,[43] American reference dates than foreign, and reference dates for recent than for early decades.

The matter of primary importance, however, is whether the reference cycles that we have recognized correspond to business cycles in the sense of our definition. That is the essential thing; the precision of the dates assigned to the culminating points of the expansions and contractions in business activity is a matter of detail by comparison. This investigation has reached a stage where we can be reasonably confident that the list of reference cycles, as a whole, identifies with substantial fidelity the cyclical tides that have swept the business world. The full evidence will be presented in subsequent publications. All we can attempt now is to put before the reader a few fragments of the evidence on which this confidence is based.

If business cycles really consist of roughly concurrent fluctuations in many economic activities, and if our reference dates mark approximately the turning points of business cycles, we should find expansion predominating in every period marked off as a reference expansion, and contraction predominating in every period marked off as a reference contraction. Table 21 tests this expectation by recording the movements of 46 monthly or quarterly series in successive phases of the American reference cycles. The sample leaves much to be desired. No series on employment, or the flow of incomes, or retail trade is included. Production, construction work, and banking are inadequately represented. Physical quantity series are relatively few. There are many partial duplications among the series. But these deficiencies must not be permitted to distort judgment. The sample covers fairly well the behavior of commodity prices, short- and long-term interest rates, security prices, trading in securities, foreign trade, payments by check, business failures, the activity of the iron industry, railroad traffic, and railroad investment. Several indexes of business conditions, which combine on different plans a variety of activities, are also included. The sample is thus of sufficient scope to lend serious interest to the results.

[42] See our *Bulletin 61*, pp. 2-3.

[43] But when an error does occur in an annual date, it is likely to be more serious than an error in a monthly date: the former cannot be less than twelve months.

The fiscal-year reference scale for the United States was derived from smaller samples of time series than the calendar-year scale, and therefore is not so trustworthy as the latter.

The table shows the direction of movements in successive reference phases, without any regard to the size of the movements. Each series covers at least 25 reference phases, ending in 1933. Hence the table includes 46 series in every phase since 1890, and a diminishing number in earlier phases.[44] A plus entry for a reference phase indicates a rise, a minus indicates a decline, zero indicates no change.[45] If a series systematically tends to move early or late at the reference turns, that fact is taken into account in ascertaining its direction of movement; the size of the lead or lag, if any, is entered in the two columns following the title of the series. For example, orders for locomotives tend to lead by one cycle stage at both reference peaks and troughs. Hence the sign for each reference

[44] This sample was selected from our basic collection on the following plan:

Every monthly or quarterly series that covers continuously 12 or more full reference cycles ending in 1933 was listed, the minimum period being therefore from 1891 to 1933. In the interests of simplicity it seemed desirable to limit the sample over the greater part of the period surveyed to a fixed group of series.

But in 1890 begin the price series published by the Bureau of Labor Statistics. Since many are included in our basic collection, strict adherence to the above criterion would have yielded a sample dominated by price series. This difficulty was met by including only those single-commodity price series that covered more than 12 full reference cycles. The criterion thus modified was met by 74 series.

Of the 74 series, we dropped the following 28:

Cattle receipts, Chicago
Sheep and lamb receipts, Chicago
Hog receipts, Chicago
Hog slaughter, commercial
Wool receipts, Boston
Flour shipments, Minneapolis
Raw sugar meltings, 4 to 8 ports
Stocks of cotton, visible supply
Stocks of wheat, visible supply
Stocks of raw sugar, 4 ports
Price of corn, Chicago
Price of wheat, Chicago
Price of cotton, N. Y. City
Price of cattle, Chicago
Price of sheep, Chicago
Price of hogs, Chicago
Index of wholesale prices, farm products
Index of wholesale prices, foods
Crude rubber imports
Raw silk imports
Tea imports
Coffee imports
Tin imports
Anthracite coal shipments (or production)
Crude petroleum production, Appalachian field
Petroleum wells completed, Appalachian field
Price of steel rails, Pennsylvania
Snyder's index of wages

Most (22) of these series represent marketing, crude processing, prices, imports, or stocks of agricultural commodities. Nearly all of the agricultural series are of narrow coverage—geographic, industrial, or both. The behavior of few, if any, can be regarded as important evidence of the existence or nonexistence of business cycles. In view of the dominating role nature plays in the agricultural sphere, it seemed well to exclude the purely agricultural series entirely.

Of the six remaining series, the wage index was excluded because it consists from 1875 to 1913 of a mathematical interpolation of monthly values from annual data. The other five were excluded partly because of narrow coverage, partly for other reasons: the frequency of strikes in the case of anthracite coal; a rigidly maintained price over protracted periods, in rails; limited business control over supply (a condition similar to that found in agriculture), in the two petroleum series; erratic behavior of monthly data, in tin imports.

Some of the decisions are more or less arbitrary. For example, perhaps as good a case can be made for including rubber and tin imports as for including the price series (at least tin) in Group VI of Table 21; though the fact that monthly data on imports of individual commodities are highly erratic must not be overlooked. Apart from a few doubtful cases, the series in the table are, though to an uneven degree, of broad economic significance, in contrast to the specialized nature of the items that dominate the excluded list.

[45] The signs in the columns for successive reference phases, which show direction of movement, should not be confused with the signs in the two 'lead or lag' columns, which show the characteristic timing of each series at the reference turns.

TABLE 21

Directions of Movement in Successive Reference Phases, 1854–1933
46 American Series

Series no.	Series	Lead (−) or lag (+) in cycle stages at reference		E 57	C 58	E 60	C 61	E 65	C 67	E 69	C 70	E 73	C 79	E 82	C 85
		Peak	Trough												
	I GENERAL BUSINESS ACTIVITY														
1	Ayres' index of business activity	0	0	+	−	+	−	+	−	+	−	+	−	+	−
2	Persons' index of production & trade	0	0	..	..	..	..	..	..	..	..	..	..	+	−
3	Axe-Houghton index of trade & industrial activity	0	0	..	..	..	..	..	..	..	..	..	..	+	−
4	A.T.&T. index of business activity	0	0	..	..	..	..	..	..	..	..	..	..	+	−
5	Pittsburgh index of business	0	0	..	..	..	..	..	..	..	..	..	..	..	..
6	Bank clearings, total	0	−1	..	..	..	..	..	..	..	..	..	..	+	−
7	Bank clearings outside N.Y.City	0	−1	..	..	..	..	..	..	..	..	..	..	+	−
8	Bank clearings outside N.Y.City, deflated	0	−1	..	..	..	..	..	..	..	..	..	..	+	−
9	Snyder's clearings index of business	0	0	..	..	..	..	..	..	..	..	..	..	+	−
10	Snyder's index of deposits activity	−1	−1	..	..	..	..	..	..	..	..	..	..	+	−
	II ORDERS FOR INVESTMENT GOODS														
11	Orders for locomotives	−1	−1	..	..	..	..	..	..	..	..	+	−	+	−
12	Orders for freight cars	−1	−1	..	..	..	..	..	..	..	..	+	+	+	−
13	Orders for passenger cars	−1	−1	..	..	..	..	..	..	..	..	+	+	+	−
14	Plans filed for new buildings, Manhattan	−2	−2	..	..	..	..	..	..	+	−	−	−	+	+
	III PRODUCTION														
15	Railroad freight ton-miles	0	−1	..	..	..	..	..	..	+	+	+	+	+	+
16	Pig iron production	0	0	..	..	..	..	..	..	..	..	..	..	+	−
	IV FOREIGN TRADE														
17	Total imports	0	−1	..	..	..	..	..	..	+	+	+	−	+	−
18	Total exports	0	0	..	..	..	..	..	..	+	+	+	+	+	−
	V INDEXES OF PRICES														
19	Snyder's index of general prices	0	0	..	..	..	−	+	−	−	−	−	−	+	−
20	Wholesale prices, total	0	0	+	−	−	−	+	−	−	−	−	−	+	−
21	Wholesale prices, metals & metal products	0	0	..	..	..	..	..	..	..	..	..	..	..	..
22	Wholesale prices, building materials	+1	0	..	..	..	..	..	..	..	..	..	..	..	..
23	Wholesale prices, fuel & lighting	0	0	..	..	..	..	..	..	..	..	..	..	..	..
24	Wholesale prices, chemicals & drugs	0	0	..	..	..	..	..	..	..	..	..	..	..	..
25	Wholesale prices, textiles	0	0	..	..	..	..	..	..	..	..	..	..	..	..
26	Wholesale prices, housefurnishing goods	+1	+1	..	..	..	..	..	..	..	..	..	..	..	..
27	Wholesale prices, hides & leather products	0	−1	..	..	..	..	..	..	..	..	..	..	..	..
	VI WHOLESALE PRICES OF INDIVIDUAL COMMODITIES														
28	Pig iron, Philadelphia	0	0	−	−	+	−	+	−	−	−	+	−	+	−
29	Steel billets, Pittsburgh	0	+1	..	..	..	..	..	..	..	..	..	..	..	..
30	Slab zinc, N.Y.City	0	0	..	..	..	..	..	..	..	..	..	..	+	−
31	Copper, N.Y.City	0	0	..	..	..	−	+	−	+	−	+	−	+	−
32	Pig lead, N.Y.City	0	0	..	..	..	..	..	..	..	..	+	−	+	−
33	Pig tin, N.Y.City	0	0	..	..	..	..	..	..	..	..	..	..	..	−
	VII MONEY AND SECURITY MARKETS														
34	Bank clearings, N.Y.City	−1	−1	+	−	+	−	+	−	+	−	+	−	+	−
35	Shares traded, N.Y.Stock Exchange	−1	−1	..	..	..	..	..	..	..	..	..	..	+	−
36	Bonds traded, N.Y.Stock Exchange, *inverted*	+2	+1	..	..	..	..	..	..	..	..	..	..	..	..
37	Index of 'all' common stock prices	−1	−1	..	..	..	..	..	..	..	..	..	−	+	−
38	Index of railroad stock prices	−1	−1	..	−	+	−	+	−	+	+	+	−	+	−
39	Call money rates, N.Y.Stock Exchange	0	0	..	−	+	−	−	−	+	−	+	−	+	−
40	90-day money rates, stock exchange loans	+1	0	..	..	..	..	..	..	..	..	..	..	..	..
41	Commercial paper rates, N.Y.City	+1	+1	..	−	+	−	+	+	+	−	−	−	+	−
42	Railroad bond yields	+1	+2	..	−	+	−	+	0	+	−	−	−	−	−
	VIII BUSINESS FAILURES														
43	Number (Dun's), *inverted*	0	0	..	..	..	..	..	..	..	..	..	..	+	−
44	Number (Bradstreet's), *inverted*	0	0	..	..	..	..	..	..	..	..	..	..	..	−
45	Liabilities (Dun's), *inverted*	−1	−2	..	..	..	..	..	..	..	..	..	..	+	−
46	Liabilities (Bradstreet's), *inverted*	−1	−2	..	..	..	..	..	..	..	..	..	..	..	−

For explanation of the signs, see text. 'E 57' stands for the reference expansion ending June 1857, 'C 58' for the reference contraction ending Dec. 1858, etc. The monthly reference dates are listed in Table 16.

See Appendix C for sources and other notes about the series.

TABLE 21—*Continued*

Directions of Movement in Successive Reference Phases, 1854–1933

46 American Series

E 87	C 88	E 90	C 91	E 93	C 94	E 95	C 97	E 99	C 00	E 02	C 04	E 07	C 08	E 10	C 12	E 13	C 14	E 18	C 19	E 20	C 21	E 23	C 24	E 26	C 27	E 29	C 33	Series no.
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	1
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	2
+	−	+	−	+	−	+	−	+	+	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	3
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	4
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	5
+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	−	+	−	+	+	+	−	+	−	+	+	+	−	6
+	−	+	−	+	−	+	−	+	+	+	−	+	−	+	+	+	−	+	+	+	−	+	−	+	+	+	−	7
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	−	+	−	+	−	+	−	+	+	+	−	8
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	−	9
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	+	+	−	10
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	11
+	−	+	−	+	−	+	−	+	+	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	−	12
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	−	+	−	+	−	−	−	13
+	−	+	+	−	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	−	+	−	14
+	+	+	+	+	−	+	−	+	+	+	+	+	−	+	+	+	−	+	−	+	−	+	−	+	−	+	−	15
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	16
+	+	+	−	+	−	+	+	−	+	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	17
−	−	+	+	−	+	+	+	+	+	+	−	+	−	−	+	+	+	+	+	+	−	+	−	+	−	+	−	18
+	+	−	−	+	−	+	−	+	+	+	+	+	−	+	+	+	−	+	+	+	−	+	−	+	+	+	−	19
0	+	−	+	−	−	+	−	+	+	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	20
.	.	.	−	−	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	−	21
.	.	.	−	−	−	−	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	−	22
.	.	.	−	−	−	+	−	+	+	+	−	+	−	−	−	+	−	+	−	+	−	+	−	+	−	−	−	23
.	.	.	+	+	−	+	+	+	+	+	−	−	−	+	−	−	+	+	−	+	−	−	−	+	−	−	−	24
.	.	.	−	+	−	+	−	+	+	−	+	+	−	+	−	+	−	+	−	+	−	+	−	−	−	−	−	25
.	.	.	+	−	−	−	−	+	+	+	−	+	−	+	−	+	+	+	+	+	−	+	−	−	−	−	−	26
.	.	.	−	−	−	+	−	+	−	+	−	+	−	+	−	+	+	+	+	+	−	−	−	−	+	−	−	27
+	−	−	−	−	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	28
+	−	+	−	−	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	−	29
+	+	+	−	−	−	+	+	+	−	+	−	+	−	+	+	+	−	+	−	+	−	+	−	+	−	+	−	30
−	+	−	−	−	−	+	+	+	−	−	+	+	−	+	+	+	−	+	−	+	−	+	−	+	−	+	−	31
+	+	−	−	−	−	−	+	+	−	−	+	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	32
+	+	−	−	−	−	−	−	+	+	−	+	+	−	+	+	+	−	+	−	−	−	+	+	+	−	−	−	33
.	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	−	+	+	+	+	+	−	34
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	+	+	−	+	−	+	+	+	−	35
.	.	−	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	−	−	+	−	+	+	+	−	36
+	−	+	−	+	−	+	−	+	+	+	−	+	−	+	−	+	−	−	+	+	−	+	−	+	+	+	−	37
+	−	+	−	+	−	+	−	+	+	+	−	+	−	+	−	+	−	−	+	−	−	+	−	+	+	+	−	38
+	−	+	−	−	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	−	+	−	39
.	.	.	+	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	−	+	−	40
+	−	+	+	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	+	+	−	41
+	−	+	+	+	−	−	−	−	+	+	+	+	−	+	+	+	0	+	+	+	−	+	−	−	+	+	−	42
+	−	−	−	+	−	−	+	+	−	−	−	+	−	+	−	+	−	+	+	+	−	+	−	−	−	+	−	43
+	−	−	−	+	−	−	+	+	−	+	−	+	−	+	−	+	−	+	+	+	−	+	−	+	−	+	−	44
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	+	+	−	−	−	+	−	+	−	45
+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	−	−	+	+	+	−	+	−	+	−	+	−	46

expansion indicates whether the average volume of orders in the stage just before the reference peak exceeded or fell short of the average in the stage just before the preceding reference trough. Likewise the sign for each reference contraction compares the average volume of orders in the stage just before the reference trough with the average in the stage just before the preceding reference peak. Of the 46 series, 22 have no tendency to lead or lag; in this group of series the signs are determined simply by comparing the standings at successive reference peaks and troughs. In bankruptcies and bond sales, which bear an inverted relation to business cycles, all signs are reversed; but it is simpler to think of these series as treated on the standard plan, after having been inverted at the start, and they are designated thus in the stub.[46]

Table 22 summarizes these entries, series by series. A small group of highly significant items—four indexes of business activity, pig iron production, and locomotive orders—invariably rise during reference expansions and decline during reference contractions. Another two indexes of business activity conform in direction to every reference phase but one. Six more series conform in direction to all but two reference phases; another seven conform to all but three phases, and another twelve to all but four or five phases. This count includes 33 series, among which are the most comprehensive items in the full sample of 46. The number of series whose fluctuations match closely our reference cycles would appear still larger if the entries in Table 21 were refined. For example, although railway freight traffic rose in eight reference contractions, the rise in seven of these instances was at a lower rate than during the adjacent phases of expansion.[47] Taken as a whole, the table clearly supports the hypothesis that many business activities in the United States have shared a common rhythm and that our reference-cycle chronology exposes and expresses this rhythm.

It is a matter of some consequence whether the reference cycles fit the cyclical fluctuations in business activities phase by phase, as well as on the average. The summary in Table 23 is directed to this question. Without exception we find that the proportion of rising series drops abruptly in passing from a reference expansion to a contraction; with equal abruptness it goes up in passing from a reference contraction to an expansion. Further, in every reference expansion the proportion of rises exceeds one-half by a good margin, and the like is true of declines during refer-

[46] This explanation covers the essentials, but is incomplete. It is not possible to go further without assuming knowledge of Ch. 5, or repeating much of that chapter. The entries in Table 21 are taken directly from our standard Table R4, explained in Ch. 5, Sec. X.

[47] Furthermore, declines that we recognize as specific-cycle contractions occurred within four of the eight reference contractions. They fail to register in Table 21, because their timing differs materially from the fixed schedule assumed in the table. See Thor Hultgren, Railway Freight Traffic in Prosperity and Depression (National Bureau of Economic Research, *Occasional Paper 5*, Feb. 1942). Table 3 of that paper is not strictly comparable with our Table 21, since the former does not take account of the tendency to lead at reference troughs.

TABLE 22

Summary of Movements in All Reference Expansions and Contractions
46 American Series, 1854–1933

Series	Number of reference expansions			Number of reference contractions			Number of reference phases		
	Covered	In which series		Covered	In which series		Covered	In which series	
		Rises	Declines		Rises	Declines		Conforms[a]	Fails to conform[b]
I GENERAL BUSINESS ACTIVITY									
Ayres' index of business activity	20	20	..	20	..	20	40	40	..
Persons' index of production & trade	15	15	..	15	..	15	30	30	..
Axe-Houghton index, trade & ind. activity	15	15	..	15	1	14	30	29	1
A.T.&T. index of business activity	15	15	..	15	..	15	30	30	..
Pittsburgh index of business	14	14	..	14	..	14	28	28	..
Bank clearings, total	15	15	..	15	4	11	30	26	4
Bank clearings outside N.Y.C.	15	15	..	15	4	11	30	26	4
Bank clearings outside N.Y.C., deflated	15	15	..	15	2	13	30	28	2
Snyder's clearings index of business	15	15	..	15	1	14	30	29	1
Snyder's index of deposits activity	15	15	..	15	2	13	30	28	2
II ORDERS FOR INVESTMENT GOODS									
Orders for locomotives	16	16	..	16	..	16	32	32	..
Orders for freight cars	16	16	..	16	3	13	32	29	3
Orders for passenger cars	16	14	2	16	1	15	32	29	3
Plans filed for new buildings, Manhattan	17	15	2	17	3	14	34	29	5
III PRODUCTION									
Railroad freight ton-miles	17	17	..	17	8	9	34	26	8
Pig iron production	15	15	..	15	..	15	30	30	..
IV FOREIGN TRADE									
Total imports	17	16	1	17	4	13	34	29	5
Total exports	17	14	3	17	9	8	34	22	12
V INDEXES OF PRICES									
Snyder's index of general prices	18	15	3	19	6	13	37	28	9
Wh. prices, total	20[c]	13	6	20	3	17	40	30	10
Wh. prices, metals & metal products	12	10	2	13	..	13	25	23	2
Wh. prices, building materials	12	9	3	13	..	13	25	22	3
Wh. prices, fuel & lighting	12	9	3	13	1	12	25	21	4
Wh. prices, chemicals & drugs	12	8	4	13	4	9	25	17	8
Wh. prices, textiles	12	9	3	13	2	11	25	20	5
Wh. prices, housefurnishing goods	12	8	4	13	4	9	25	17	8
Wh. prices, hides & leather products	12	8	4	13	3	10	25	18	7
VI WHOLESALE PRICES OF INDIVIDUAL COMMODITIES									
Pig iron, Philadelphia	20	16	4	20	..	20	40	36	4
Steel billets, Pittsburgh	14	12	2	14	..	14	28	26	2
Slab zinc, N.Y.City	15	14	1	15	3	12	30	26	4
Copper, N.Y.City	18	14	4	19	4	15	37	29	8
Pig lead, N.Y.City	16	12	4	16	3	13	32	25	7
Pig tin, N.Y.City	14	8	6	15	5	10	29	18	11
VII MONEY AND SECURITY MARKETS									
Bank clearings, N.Y.City	20	20	..	20	3	17	40	37	3
Shares traded, N.Y.Stock Exchange	15	14	1	15	2	13	30	27	3
Bonds traded, N.Y.Stock Exchange, *inv.*	13	10	3	13	1	12	26	22	4
Index of 'all' common stock prices	15	14	1	16	3	13	31	27	4
Index of railroad stock prices	19	17	2	20	4	16	39	33	6
Call money rates, N.Y.Stock Exchange	19	16	3	20	..	20	39	36	3
90-day money rates, stock exchange loans	12	11	1	13	1	12	25	23	2
Commercial paper rates, N.Y.City	19	18	1	20	3	17	39	35	4
Railroad bond yields	19	14	5	20[d]	6	12	39	26	13
VIII BUSINESS FAILURES									
Number (Dun's), *inverted*	15	11	4	15	2	13	30	24	6
Number (Bradstreet's), *inverted*	14	12	2	15	2	13	29	25	4
Liabilities (Dun's), *inverted*	15	13	2	15	1	14	30	27	3
Liabilities (Bradstreet's), *inverted*	14	13	1	15	1	14	29	27	2

Derived from Table 21.

[a] Rises during reference expansion or declines during reference contraction.

[b] Difference between the two preceding columns.

[c] Includes one reference expansion during which the series shows no change.

[d] Includes two reference contractions during which the series shows no change.

ence contractions. The smallest proportion of rises to declines in a reference expansion, or of declines to rises in a reference contraction, is 2 to 1. Though not conclusive, these results strongly indicate that the successive reference dates under test mark off units of pervasive fluctuations in business life, and thus serve the purpose for which they were designed.

TABLE 23

Summary of Movements in Successive Reference Phases, 1854–1933
Based on 46 American Series

Nature of phase	Period	Number of series covered	Number of series that			Per cent of series that	
			Rise	Decline	Show no change[a]	Rise	Decline
Exp.	1854–57	4	3	1	...	75	25
Con.	1857–58	8	...	8	...	0	100
Exp.	1858–60	8	7	1	...	88	12
Con.	1860–61	10	...	10	...	0	100
Exp.	1861–65	10	9	1	...	90	10
Con.	1865–67	10	1	8	1	15	85
Exp.	1867–69	14	11	3	...	79	21
Con.	1869–70	14	4	10	...	29	71
Exp.	1870–73	18	13	5	...	72	28
Con.	1873–79	19	4	15	...	21	79
Exp.	1879–82	32	31	1	...	97	3
Con.	1882–85	35	2	33	...	6	94
Exp.	1885–87	37	34	2	1	93	7
Con.	1887–88	37	8	29	...	22	78
Exp.	1888–90	38	29	9	...	76	24
Con.	1890–91	46	9	37	...	20	80
Exp.	1891–93	46	31	15	...	67	33
Con.	1893–94	46	1	45	...	2	98
Exp.	1894–95	46	39	7	...	85	15
Con.	1895–97	46	8	38	...	17	83
Exp.	1897–99	46	44	2	...	96	4
Con.	1899–00	46	16	30	...	35	65
Exp.	1900–02	46	41	5	...	89	11
Con.	1902–04	46	7	39	...	15	85
Exp.	1904–07	46	45	1	...	98	2
Con.	1907–08	46	1	45	...	2	98
Exp.	1908–10	46	44	2	...	96	4
Con.	1910–12	46	9	37	...	20	80
Exp.	1912–13	46	42	4	...	91	9
Con.	1913–14	46	4	41	1	10	90
Exp.	1914–18	46	42	4	...	91	9
Con.	1918–19	46	15	31	...	33	67
Exp.	1919–20	46	43	3	...	93	7
Con.	1920–21	46	...	46	...	0	100
Exp.	1921–23	46	41	5	...	89	11
Con.	1923–24	46	5	41	...	11	89
Exp.	1924–26	46	38	8	...	83	17
Con.	1926–27	46	15	31	...	33	67
Exp.	1927–29	46	38	8	...	83	17
Con.	1929–33	46	...	46	...	0	100

Derived from Table 21.

[a] These instances were split equally between the rises and declines, in computing the percentages of the following columns.

The preceding results are tested in Table 24 on the basis of three subsamples. One group includes 18 series on 'commercial and industrial activity'; a second on 'prices and financial activity' includes the remaining 28 series. The second group bears out the full sample, phase by phase.

TABLE 24

Summary of Movements in Successive Reference Phases, 1854–1933
Based on Three Subsamples Drawn from 46 American Series

Nature of phase	Period	Commercial and industrial activity[a]			Prices and financial activity[b]			Non-duplicating sample[c]		
		No. of series	Per cent of series that		No. of series	Per cent of series that		No. of series	Per cent of series that	
			Rise	Decline		Rise	Decline		Rise	Decline
Exp.	1854–57	1	100	0	3	67	33	3	67	33
Con.	1857–58	1	0	100	7	0	100	6	0	100
Exp.	1858–60	1	100	0	7	86	14	6	83	17
Con.	1860–61	1	0	100	9	0	100	7	0	100
Exp.	1861–65	1	100	0	9	89	11	7	86	14
Con.	1865–67	1	0	100	9	17	83	7	21	79
Exp.	1867–69	5	100	0	9	67	33	11	82	18
Con.	1869–70	5	60	40	9	11	89	11	27	73
Exp.	1870–73	8	88	12	10	60	40	15	73	27
Con.	1873–79	8	50	50	11	0	100	16	25	75
Exp.	1879–82	17	100	0	15	93	7	20	95	5
Con.	1882–85	17	12	88	18	0	100	22	9	91
Exp.	1885–87	18	94	6	19	92	8	23	89	11
Con.	1887–88	18	11	89	19	32	68	23	30	70
Exp.	1888–90	18	100	0	20	55	45	24	75	25
Con.	1890–91	18	17	83	28	21	79	25	32	68
Exp.	1891–93	18	89	11	28	54	46	25	68	32
Con.	1893–94	18	6	94	28	0	100	25	4	96
Exp.	1894–95	18	100	0	28	75	25	25	88	12
Con.	1895–97	18	11	89	28	21	79	25	12	88
Exp.	1897–99	18	94	6	28	96	4	25	92	8
Con.	1899–00	18	33	67	28	36	64	25	40	60
Exp.	1900–02	18	100	0	28	82	18	25	96	4
Con.	1902–04	18	6	94	28	21	79	25	12	88
Exp.	1904–07	18	100	0	28	96	4	25	96	4
Con.	1907–08	18	6	94	28	0	100	25	0	100
Exp.	1908–10	18	94	6	28	96	4	25	92	8
Con.	1910–12	18	22	78	28	18	82	25	16	84
Exp.	1912–13	18	100	0	28	86	14	25	88	12
Con.	1913–14	18	6	94	28	12	88	25	18	82
Exp.	1914–18	18	94	6	28	89	11	25	88	12
Con.	1918–19	18	17	83	28	43	57	25	32	68
Exp.	1919–20	18	100	0	28	89	11	25	96	4
Con.	1920–21	18	0	100	28	0	100	25	0	100
Exp.	1921–23	18	100	0	28	82	18	25	84	16
Con.	1923–24	18	17	83	28	7	93	25	8	92
Exp.	1924–26	18	100	0	28	71	29	25	76	24
Con.	1926–27	18	33	67	28	32	68	25	36	64
Exp.	1927–29	18	94	6	28	75	25	25	76	24
Con.	1929–33	18	0	100	28	0	100	25	0	100

See notes to Table 23.

[a] Includes groups I-IV in Table 21.

[b] Includes groups V-VIII in Table 21.

[c] Includes series 8, 11-18, 21-27, 34-37, 39-42, and 46, as numbered in Table 21. Since series 21-27 do not go back of 1890, series 20 and 28-33 are used instead through 1890. Series 46 was preferred to series 45, because its dollar coverage is on the average larger.

In the first group, rises slightly outnumber declines in one reference contraction and equal the number of declines in another; but these anomalies occur before our sample reaches its full size. Finally, the table shows the movements of 25 series that are practically independent, in the sense that their coverage is practically free from duplication. The summary for this subsample is easier to interpret than the summary for the full sample, for the subsample has some claim to statistical purity while the full sample has none. At the same time, the duplications in the latter tend on the whole to give additional weight to the more important activities in the sample. But we need not dwell on the respective merits of the two samples, for the nonduplicating series confirm closely the results for the full sample.

Further confirmation is afforded by Table 25, which records the number of rises and declines determined on three principles. The entries under 'A' repeat the results in Table 23. Method B is the same as method A, except that it makes no allowance for the characteristic lead or lag of some series at reference turns.[48] Method C is a hybrid of A and B. If the movement of a series appears as countercyclical (that is, as a rise in a reference contraction or a decline in a reference expansion) when method A is used but as conforming when method B is used, it is counted as conforming in method C. In all other instances the count in method C is the same as in A.[49] Thus method B ignores leads or lags entirely, A recognizes fixed leads or lags, while C admits some flexibility in timing. Of the three methods, B supplies the severest test of our hypothesis that the reference cycles mark off units of roughly concurrent fluctuations in many economic activities. Method C, on the other hand, is most closely geared to our hypothesis, which admits the possibility of irregular leads or lags.[50] But the merits of the several methods need not detain us; in view of the roughness of each, it is better to regard them as supplements than as alternatives. In any event, each method supports the list of reference cycles.[51]

48 The count was made from a table similar to Table 21. Of course, the entries in the two tables were identical for the 22 series for which no allowance for leads or lags was necessary in Table 21.

49 There is nothing to recommend this method of admitting flexibility, except that it is easy to compute, allows no room for subjective judgments, and is conservative—in the sense that it allows only slight flexibility.

50 Cf. p. 6.

51 So do several other methods, not reproduced for reasons of economy. The one discordant item in these experiments is the result of method B for the reference contraction of 1899–1900. But the peak from which this contraction starts is predated, perhaps by a half year. A rough adjustment for the error in dating may be obtained by measuring the change from the first third of the reference contraction to the trough (that is, from stage VI to IX in our standard Table R1, instead of from V to IX). According to this computation, likely to be an understatement, the percentage of declines is 61. It may also be noted that 72 per cent of the series 'conform' to the reference contraction even as dated; that is to say, the rate of change during this fixed interval is algebraically smaller than in the next preceding and following expansions in 72 per cent of the series in our sample.

Besides the general results already indicated, Tables 23-25 bring out the uneven diffusion of business cycles, which is one of their outstanding characteristics. On the average the proportion of rises during reference expansions exceeds slightly the proportion of declines during reference

TABLE 25

Summary of Movements in Successive Reference Phases, 1854–1933
Based on Different Methods Applied to 46 American Series

Nature of phase	Period	No. of series covered	Per cent of series that rise when			Per cent of series that decline when		
			Allowance is made for fixed leads or lags[a] (A)	No allowance is made for leads or lags[b] (B)	Allowance is made for flexible leads or lags[b] (C)	Allowance is made for fixed leads or lags[a] (A)	No allowance is made for leads or lags[b] (B)	Allowance is made for flexible leads or lags[b] (C)
Exp.	1854–57	4	75	75	75	25	25	25
Con.	1857–58	8	0	0	0	100	100	100
Exp.	1858–60	8	88	75	88	12	25	12
Con.	1860–61	10	0	10	0	100	90	100
Exp.	1861–65	10	90	80	90	10	20	10
Con.	1865–67	10	15	30	5	85	70	95
Exp.	1867–69	14	79	79	79	21	21	21
Con.	1869–70	14	29	25	21	71	75	79
Exp.	1870–73	18	72	56	78	28	44	22
Con.	1873–79	19	21	37	21	79	63	79
Exp.	1879–82	32	97	97	97	3	3	3
Con.	1882–85	35	6	6	6	94	94	94
Exp.	1885–87	37	93	88	93	7	12	7
Con.	1887–88	37	22	32	19	78	68	81
Exp.	1888–90	38	76	58	76	24	42	24
Con.	1890–91	46	20	26	17	80	74	83
Exp.	1891–93	46	67	59	70	33	41	30
Con.	1893–94	46	2	4	2	98	96	98
Exp.	1894–95	46	85	78	85	15	22	15
Con.	1895–97	46	17	34	17	83	66	83
Exp.	1897–99	46	96	93	96	4	7	4
Con.	1899–00	46	35	52	33	65	48	67
Exp.	1900–02	46	89	80	89	11	20	11
Con.	1902–04	46	15	26	15	85	74	85
Exp.	1904–07	46	98	87	98	2	13	2
Con.	1907–08	46	2	7	0	98	93	100
Exp.	1908–10	46	96	91	96	4	9	4
Con.	1910–12	46	20	26	20	80	74	80
Exp.	1912–13	46	91	90	93	9	10	7
Con.	1913–14	46	10	13	10	90	87	90
Exp.	1914–18	46	91	87	93	9	13	7
Con.	1918–19	46	33	37	28	67	63	72
Exp.	1919–20	46	93	91	93	7	9	7
Con.	1920–21	46	0	5	0	100	95	100
Exp.	1921–23	46	89	89	93	11	11	7
Con.	1923–24	46	11	20	9	89	80	91
Exp.	1924–26	46	83	76	85	17	24	15
Con.	1926–27	46	33	29	25	67	71	75
Exp.	1927–29	46	83	77	85	17	23	15
Con.	1929–33	46	0	2	0	100	98	100

In an insignificant number of instances, a series showed zero change during a reference phase. Their treatment is explained in Table 23, note 'a'.

[a] Taken directly from Table 23.
[b] Explained in text.

TABLE 26

Relation between the Amplitude and Diffusion of Business Cycles
United States, 1879–1933

Method of ascertaining direction of movement[a]	Average per cent of series that					
	Rise in expansions whose amplitude is[b]			Decline in contractions whose amplitude is[c]		
	Mild	Moderate	Vigorous	Mild	Moderate	Severe
B.....	73	84	91	67	74	95
A.....	81	90	94	75	82	98
C.....	83	91	95	78	84	98

Derived from Table 25. The averages are unweighted arithmetic means. Weighting by number of series would change the averages by one point at most. It cannot be of much consequence because the sample is fixed, starting with the reference contraction of 1890–91.

[a] See the headings in Table 25 and the explanations in the text.

[b] To classify business-cycle expansions according to intensity of amplitude (see Table 156), we (a) matched the specific-cycle expansions of three indexes of business activity (A.T.&T., Ayres, and Persons) with the reference expansions, (b) ranked the fifteen expansions in each index from 1879 to 1929, (c) averaged the ranks of the three indexes for each reference expansion, (d) sorted the reference expansions into three equal groups on the basis of the average ranks. The results are as follows—
Mild (smallest 5): 1888–90, 1891–93, 1900–02, 1912–13, 1927–29
Moderate (next 5): 1885–87, 1894–95, 1904–07, 1919–20, 1924–26
Vigorous (largest 5): 1879–82, 1897–99, 1908–10, 1914–18, 1921–23

[c] The cyclical contractions were classified on the same plan as the expansions, with the following results—
Mild (smallest 5): 1887–88, 1899–1900, 1902–04, 1910–12, 1926–27
Moderate (next 5): 1890–91, 1895–97, 1913–14, 1918–19, 1923–24
Severe (largest 5): 1882–85, 1893–94, 1907–08, 1920–21, 1929–33

contractions. This is the result to be expected in a progressive economy.[52] However, there are more business-cycle contractions in which every or almost every series of our sample declines than there are expansions in which every or almost every series rises. Consequently, the proportion of falls during reference contractions varies more from case to case than does the proportion of rises during reference expansions. Table 26 demonstrates that the degree of cyclical diffusion is correlated with the amplitude of cyclical fluctuations. Since 1879[53] practically all series in our sample declined during severe business-cycle contractions, while a substantial proportion rose during mild contractions.[54] The diffusion of business-cycle expansions is likewise correlated with their amplitude, though the correlation is not so close as in contractions (see Tables 25 and 156).[55]

[52] The average per cent of rises during reference expansions is 82, 88, 89, according to methods B, A and C, respectively, in the sample of 46 series. The corresponding averages of the per cent of declines during reference contractions are 78, 85, and 87. The discrepancy between the averages for expansion and contraction would be more prominent if the sample excluded series adjusted for secular trend and included more volume series relatively to price series. The averages just cited are weighted arithmetic means, the weight being the number of series covering a reference phase.

[53] That is as far back as it is safe to go at present, in view of the diminishing size of the sample and the uncertainties in grading the severity of cyclical movements. Cf. pp. 455, 462, 464.

[54] It may be of interest to note (Table 24) that, according to method A, every series on 'prices and finance' declined during the five severe contractions between 1879 and 1933. This happened as well in the substantial contractions of 1857–58 and 1873–79. However, back of 1879 the sample shrinks rapidly.

[55] If we may judge from our sample, there is no significant correlation between the duration of reference phases and cyclical diffusion.

From the uneven diffusion of business fluctuations and the correlation of this feature with their amplitude springs discord in chronologies of business cycles. There is a growing tendency among economists to regard mild and severe business contractions as belonging to one species of phenomena, but disagreements on this issue persist. Every competent judge who admits the existence of business cycles will readily agree that violent contractions, such as occurred in 1907–08, 1920–21 and 1929–33, are business-cycle movements. But there is disagreement whether a mild and uneven contraction such as that of 1887–88 or 1926–27 may be justly considered a phase of business cycles.[56] It is still a fairly common practice among theorists, when venturing observations on the history of business cycles, to recite with little ado chronologies restricted to 'booms' and 'severe depressions'. Economic historians still have a special predilection for 'crises' dates. These traditional procedures have been dropped by economic statisticians; not from a love of novelty, but because their method of working trains and disciplines the eye. Observing in their charts a continuous gradation from 'mild' to 'vigorous' fluctuations, they have been impelled to recognize as business cycles many movements that are overlooked or slighted by literary investigators. Their chronologies are very similar to ours,[57] though their language is not always the same.

Table 27 shows compactly how our list of business cycles in the United States between 1854 and 1938 compares with the lists of other investigators, each of whom has chronicled all or a substantial part of this period on some independent basis. Kitchin, Persons, Ayres, and Axe and Houghton speak explicitly of dating 'business cycles'. Eckler observes that some contractions on his list should be regarded as 'recessions' rather than 'depressions'. Hubbard writes in a similar vein: "minor movements, when well defined, have been included, whether such movements are properly to be classified as depressions or not".[58] Both Hubbard and Eckler seem to imply that only a 'depression'—by which they mean a severe contraction—can mark the close of a business cycle. Similar views are held by Gilbert, who argues, for example, that a 'recession', not a 'depression', occurred late in 1887 and early in 1888: "to consider the dip and recovery of 1887 and 1888 as more than a slight adjustment or breathing space in the forward march is to deny the significance of those fundamental changes which have been distinguished as business cycles".[59] It does not seem that more is meant here by 'fundamental changes' than vigorous expansions and severe contractions. Terminological prefer-

[56] These matters are rarely analyzed scientifically. Cf. Mitchell, *Business Cycles: The Problem and Its Setting*, pp. 464-8, and our *Bulletin 61*, pp. 2, 18-20.

[57] Economic statisticians have also called attention to fluctuations of a higher order than business cycles. It is instructive to note in this connection that their chronologies of 'long cycles' differ widely. See Ch. 11.

[58] *Review of Economic Statistics*, Feb. 1936, p. 17.

[59] *Ibid.*, Aug. 1933, pp. 142-3.

TABLE 27

Business Cycles Recognized by the National Bureau and Other Investigators, United States, 1854–1938

Investigator	Period covered by comparison[a]	Number of cyclical phases[b] during this period in N.B.E.R. chronology	Cyclical phases recognized by N.B.E.R. that investigator omits	Cyclical phases not recognized by N.B.E.R. that investigator lists	Criterion for dating business cycles	Source of publication
J. Kitchin	1890–1920	18	None	None	Bank clearings, wholesale prices, and commercial paper rates	Cycles and Trends in Economic Factors, *Review of Economic Statistics*, Jan. 1923, p. 10.
E. W. Axe and R. Houghton	1885–1929	27	Con. 1926–27	None	Axe-Houghton index of trade and industrial activity	Financial and Business Cycles, Manufacturing Growth, and Analysis of Individual Industries, 1883–1930, *The Annalist*, Jan. 16, 1931, pp. 150-1. Numerous misprints; verified from pp. 95, 162-3 of this source, and *ibid.*, Jan. 15, 1926, pp. 115-6, and July 18, 1930, pp. 102-3.
W. M. Persons	1873–1938	33	None	Exp. 1875–76 Con. 1898	Persons' index of production and trade (Barron's index after 1929)	*Forecasting Business Cycles* (John Wiley, 1931), pp. 84-5, 198. Continued after 1929 according to Persons' method, by Elmer C. Bratt, *Business Cycles and Forecasting* (Business Publications, 1940), p. 401.
A. R. Eckler	1873–1933	31	Con. 1918–19	None	Six annual series: railway operating revenues, imports, pig iron production, cotton consumption, coal production (bituminous and anthracite), bank clearings or debits for selected cities.	A Measure of the Severity of Depressions, 1873–1932, *Review of Economic Statistics*, May 1933, p. 79.
D. W. Gilbert	1854–1929	39	Con. 1918–19	Exp. 1866	Ayres' index of business activity, Persons' index of production and trade, Snyder's clearings index of business. Also the following annual records: Thorp's annals, Bullock's analyses of imports and postal revenues, and Cole's index of domestic trade (1843–62).	Business Cycles and Municipal Expenditures, *Review of Economic Statistics*, Aug. 1933, pp. 140-1.
J. B. Hubbard	1873–1912, 1920–33	26	Exp. 1894–95 Con. 1926–27	None	Frickey's clearings index for seven cities outside New York before World War I. Bank debits for 241 cities (excluding Boston, Chicago, Los Angeles, San Francisco, Detroit, Philadelphia and Cleveland, as well as New York) after the war.	Business Declines and Recoveries, *Review of Economic Statistics*, Feb. 1936.
L. P. Ayres	1854–1938	42	Con. 1926–27	None	Ayres' index of business activity	*Turning Points in Business Cycles* (Macmillan, 1939), pp. 19, 35, 51.

[a] The years cited relate to the corresponding monthly reference peaks or troughs in our chronology.

[b] That is, expansions or contractions of business cycles.

ences aside, it is plain that our chronology and the chronologies of the other investigators are designed to describe the same class of facts. Hence we feel free to speak of all of them as chronologies of business cycles.

It appears that only three cyclical movements in our list lack counterparts in one or more of the other chronologies. In fact, the area of real disagreement is even smaller than Table 27 may suggest.[60] Hubbard treats the period from 1893 to 1897 as a single depression. But he observes that "for certain purposes, it is probably desirable to consider the fluctuations of the period as involving two depressions: that of 1893, followed by substantial and persistent recovery, and then relapse into depression again in 1896".[61] Since that is precisely the course we have chosen, there is no genuine difference between us. The contraction of 1918–19 is not recognized by Eckler or Gilbert, whose chronologies run by years,[62] whereas the other chronologies are monthly.[63] In view of the exceptional brevity and moderate amplitude of this contraction, its failure to register in annual summaries is not surprising. Finally, the period from 1924 to 1929 is treated as a single expansion in three of the chronologies. The reasons for this treatment by Ayres and by Axe and Houghton are obscure.[64] In Hubbard's case, the omission of the 1926–27 contraction merely means that it failed to register in bank debits of selected centers outside New

60 However, the table is silent on one point. Although our list of business cycles agrees with Kitchin's in the period for which he supplies actual dates, he intimates a chronology of 'minor cycles' (Kitchin prefers this term but uses it interchangeably with business cycles) that diverges somewhat from ours prior to 1890. See Ch. 11, Sec. V.

Table 27 is confined to the period covered by our monthly reference dates. In the period covered exclusively by the annual reference dates (1834–54), comparisons can be made between our chronology and those of Ayres and Gilbert. Every cyclical movement we list in this period is recognized also by Ayres and Gilbert, except the contraction of 1845–46. The genuineness of this movement had previously been challenged by C. J. Bullock and H. L. Micoleau in their paper on Foreign Trade and the Business Cycle, *Review of Economic Statistics*, Nov. 1931, pp. 153-4. Arthur H. Cole has commented on the difficulty of distinguishing cyclical movements in the vicinity of the alleged contraction. See W. B. Smith and A. H. Cole, *Fluctuations in American Business, 1790–1860* (Harvard University Press, 1935), p. 136. In an able study by David Schwartz the conclusion is reached that 1846 was a year of "mild depression", but that "of all the recessions" during 1843–59 "that of 1846 is certainly by far the mildest and the one which affected the least number of spheres of activity" (*A Reinterpretation of American Business Cycle History, 1843–1859*. Unpublished master's thesis, University of California, May 1941).

61 *Review of Economic Statistics*, Feb. 1936, p. 20. See also Hubbard's earlier study, *ibid.*, Nov. 1930, pp. 183-4.

62 Eckler derived his chronology from annual data and expressed it by calendar years. With minor exceptions Gilbert made qualitative judgments for full calendar years on the basis of both monthly and annual records; in our judgment these records, on the whole, indicate a contraction in 1918–19.

63 Indeed, Kitchin dated peaks and troughs to the hundredth of a year.

64 Ayres writes: "There was a minor business downturn in 1927 which was not sufficiently important to be considered as marking the end of a cycle" (*Turning Points in Business Cycles*, p. 45). But if we may judge from the index he used as a criterion for marking off business cycles, this decline is a trifle longer and at least as large as the 1887–88 decline, and definitely larger though a little shorter than the 1869–70 decline, both of which Ayres considers as marking the end of a business cycle. A similar remark applies to Axe and Houghton: according to their trend-adjusted index of trade and industrial activity (the series they used to mark off business cycles), the contraction of 1926–27 is a trifle milder but appreciably longer than the contraction of 1887–88.

York City, the indicator on which he relied to identify business cycles.[65]

Table 27 calls attention also to several movements that have no place in our chronology. These 'extra' movements raise the question whether we may not have recognized too few, rather than too many, business cycles. Some uncertainty is bound to surround this matter, at least until precise distinctions are drawn between business cycles and shorter fluctuations. We should, however, be able to determine whether the 'line' separating business cycles from other fluctuations has been drawn with tolerable consistency in our chronology; that is, whether our list of cycles excludes any movements that are clearly 'larger' than certain other movements that are included. The preceding tabulations for the sample of 46 series throw no light on this question; for close conformity to a given reference phase does not rule out the possibility that this phase might be subdivided into segments, each characterized also by good conformity, and yet no shorter in duration or smaller in amplitude than certain phases recognized by our chronology.

We have tested this possibility on sundry occasions in the past, when movements not covered by our reference scale seemed to recur in a variety of activities. The matter has been tested again by examining the specific-cycle turns of the sample of 46 series analyzed in this chapter. These studies have yielded negative or inconclusive results. Although it is impossible to predict what more thorough investigation will disclose, it seems highly improbable that our chronology omits any movements that are clearly 'larger' than any now included. It is unlikely that it even omits any movements that rival closely any now recognized. We have been unable to find strong evidence in favor of the two 'extra' cyclical movements suggested by Persons.[66] The evidence seems a shade more favorable

[65] But as he well observes, "a single measure of business activity cannot tell the whole story" (*Review of Economic Statistics*, Feb. 1936, p. 16). 'Outside debits' in 1927 were not uninfluenced by the intense speculative activity of the time. Cf. Edwin Frickey, Outside Bank Debits Corrected for Seasonal Variation: Monthly and Weekly, 1919–31, *ibid.*, May 1931.

[66] Persons' basic chronology of 'phases of business cycles' is derived from his index of industrial production and trade, which starts in Jan. 1875. In 1875–76 the index consists solely of Frickey's series on bank clearings in seven cities, adjusted for trend (p. 91). Persons characterizes Jan. 1875–Jan. 1876 as 'prosperity' (p. 198), defined as "that interval of supra-normal business . . . ending with the month preceding a persistent recession to sub-normal business" (p. 197). Since 'prosperity' is preceded by 'recovery', it would appear that expansion started months before Jan. 1875 and continued through the year. But in other places Persons suggests that the crisis of 1873 was followed by depression in 1874 (pp. 85-7); describes 1875–78 as characterized by "deflation and the struggle for resumption of specie payments; great increase in agricultural production of the world accompanied by declining commodity prices" (pp. 89, 93); and claims that 'business expansion' occurred in the last quarter of 1875 (p. 93). It is impossible to reconcile these statements with an expansion that is supposed to have started before Jan. 1875. (All page references are to W. M. Persons, *Forecasting Business Cycles*.)

Again, the contraction of 1898 is a dubious entry in Persons' list from the standpoint of his criteria, though not necessarily of ours. Persons dates a trough in Oct. 1896, a recovery from Nov. 1896 to Feb. 1898, a recession from March to June 1898, and a trough from July to Oct. 1898. Since the 'recovery' never developed into 'prosperity' (statistically, the index failed to reach 100 in Feb. 1898), this cycle fails to meet Persons' specifications of a business cycle. Cf. Elmer C. Bratt, *Business Cycles and Forecasting*, p. 401.

to the mild 'extra' movement in Gilbert's chronology. But monthly statistical records for 1865–67 are very scanty, and extensive study of contemporary journals will be necessary before a firm decision can be reached.[67]

Another check on our chronology is made possible by the 'pattern' of fluctuations in American business activity, which Edwin Frickey has derived from thirteen important time series,[68] by quarters, from 1866 to 1914. Three variants of this pattern are exhibited in Chart 10. The curve marked 'supplementary standard pattern' is the most useful for our purposes, since it involves no adjustment for the secular trends in the original data. The 'standard pattern' makes approximate adjustments for trend, and the 'revised standard pattern' makes refined adjustments.[69] Except for the secular drift in the 'supplementary standard pattern', the form of the three curves is much the same. Frickey examined in detail the movements of the thirteen series from which the pattern was derived, and tested the results by analyzing an extensive body of materials that played no part in the original derivation of the pattern. At the end of his labors he felt able to conclude that in "the United States over the half-century from the close of the Civil War to the outbreak of the World War in 1914, there is a clearly-defined pattern of short-run fluctuation which permeates the whole structure of the nation's industrial and commercial life".[70]

In view of the importance of this conclusion and the scientific care of its architect, it is especially desirable to see how well our list of reference cycles agrees with the cyclical waves in Frickey's pattern. On Chart 10 we have drawn vertical lines at the months when business activity reaches peaks and troughs according to our chronology, shaded the reference contractions so that they stand out prominently, and marked by asterisks the 'specific cycles' that we recognize in each of Frickey's curves. The turning points of these specific cycles vary somewhat from curve to curve, and vary still more from our reference dates; such differences are natural in

67 On the basis of preliminary explorations, Isaiah Frank, formerly on our staff, has suggested that the reference peak be dated in Oct. 1864 instead of April 1865, and that a trough be recognized in Aug. 1865. He was uncertain, however, whether Aug. 1865–June 1869 should be treated as a single expansion, or broken into three phases: expansion from Aug. 1865 to some later date, contraction from this date to about Dec. 1867, expansion thereafter to about June 1869.

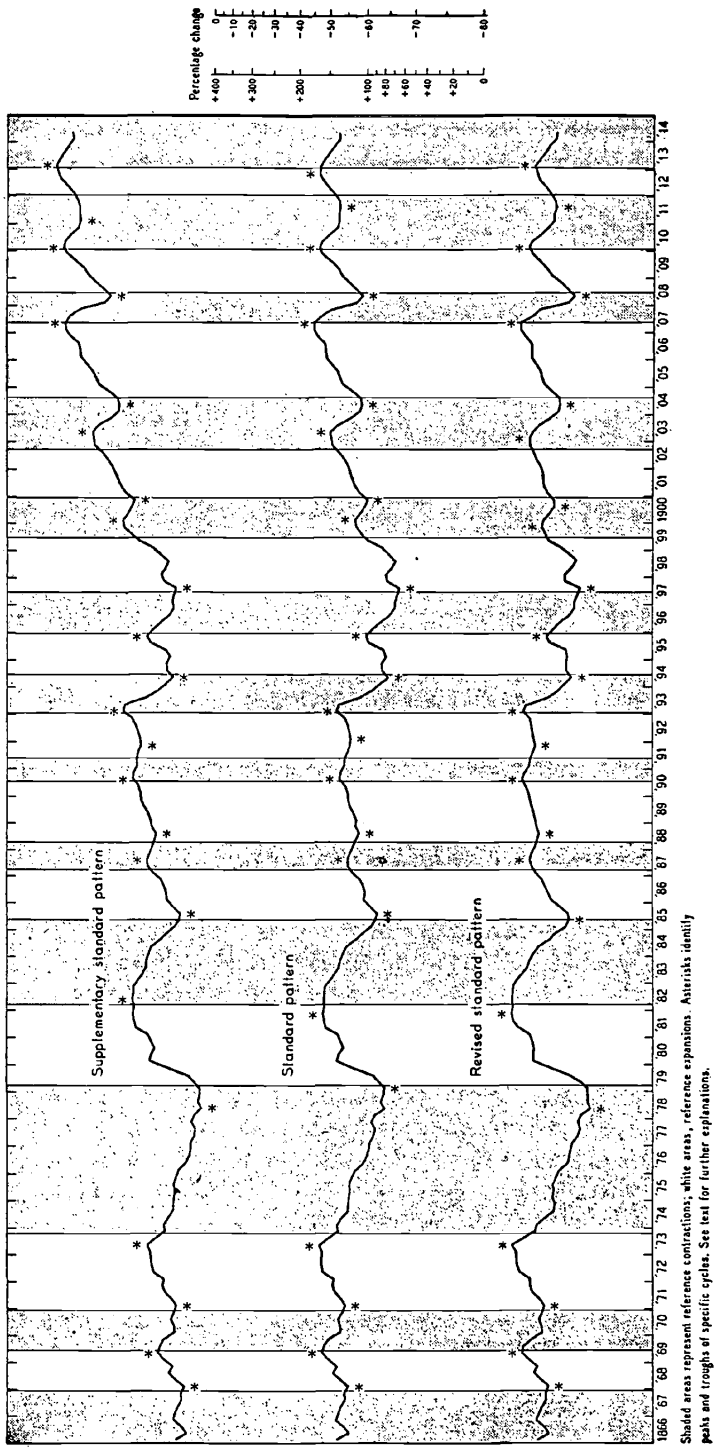
68 Clearings in seven cities outside New York (only Philadelphia before 1875), New York clearings, loans of New York banks, railroad earnings, imports, exports, immigration, sensitive commodity prices, wholesale commodity prices, railroad stock prices, industrial stock prices, bond prices, commercial paper rates.

69 Also, three series (loans of New York banks, exports, and bond prices) were dropped, and the form of two others (outside clearings, railroad earnings) changed. For the derivation of the pattern curves, see E. Frickey, *Economic Fluctuations in the United States*, Ch. III, IV, XII, XIV, and the appendices to these chapters. The figures for the 'revised standard pattern' are taken from p. 328. We are indebted to Frickey for the figures of the 'standard' and 'supplementary standard' patterns, and to the Harvard University Committee for Research in the Social Sciences for permission to reproduce them.

70 *Ibid.*, p. 230.

CHART 10

Frickey's Standard Pattern of Short-term Fluctuations in American Business Activity, 1866 – 1914



Shaded areas represent reference contractions; white areas, reference expansions. Asterisks identify peaks and troughs of specific cycles. See text for further explanations.

view of the differences in the time unit, data, and methods used. The matter of chief interest is the correspondence between our reference cycles and the cycles in Frickey's pattern. Allowing for leads or lags, every reference phase is reflected in a movement of corresponding direction, lasting three quarters or longer in each of Frickey's curves. Again, every movement keeping the same direction for three quarters or longer in any of Frickey's curves is matched by a corresponding movement in our chronology; so that the two sets of cyclical waves are in one-to-one correspondence throughout. Except for the contraction in 1900, which lasted three quarters, the duration of each expansion and contraction that we have marked off in Frickey's curves is at least one year. If any 'extra' cyclical phase were recognized in one or another of Frickey's curves, it could not be of more than two quarters' duration, and its amplitude would at best be marginal.[71]

The preceding analysis is confined to the reference dates of American business cycles. Our experience indicates that the lists of reference cycles for foreign countries are at least tolerable, if not equally good, approximations to the historical course of their business cycles. However, the contraction we list for Germany between August 1903 and February 1905 is dubious. The chronology for France in the 1860's and 1870's requires careful reconsideration. After 1932 the economic situation in France is marked by many confusions and conflicts, which render any description in business-cycle terms uncertain. German developments since 1932 raise a different problem. When the National Socialists came into power, they made drastic changes in economic organization. Production and distribution continued to be carried on mainly by business enterprises, but these enterprises were subjected to increasingly strict and pervasive governmental controls. The Nazi State repudiated the concept of individual freedom in business enterprise as in other matters. Large-scale preparation for war produced a great expansion in employment and output. Fragmentary records indicate that the expansion continued after the war started, but we do not have the data to determine when the peak of this movement was reached. Nor do we know when the German economy, now in utter collapse, will begin to revive. Close to thirteen years have already passed since the cyclical trough we have set in August 1932, so that the full 'cycle' will last longer than the extreme limit set by our definition. But this German episode is not an exception to our working rule about the duration of business cycles where free enterprise prevails.

[71] The following 'extra' movements of two quarters' duration can be distinguished: (a) expansion between the second and last quarters in 1866, (b) expansion between the first and third quarters in 1870, (c) contraction between the first and third quarters in 1880, (d) contraction between the first and third quarters in 1898. In the 'standard' pattern, (a) and (b) are of smaller amplitude than any expansion, and (c) and (d) are of smaller amplitude than any contraction, marked on the chart. The same is true of the 'supplementary standard' pattern. The same is true again of (b) and (c) in the 'revised standard' pattern; but in this pattern (a) exceeds slightly the amplitude of one recognized expansion (1891–93), and (d) exceeds slightly the amplitude of one recognized contraction (1887–88).

It is not profitable to push critical evaluation of our reference chronology further at this juncture. A fully dependable list of business cycles in several countries can be attained only as the end product of a thorough study of business cycles. An investigator who strives for such a result must proceed by successive approximations, using what he learns from one approximation to improve the next. For all its faults, we are confident that our present chronology of business cycles in four countries is sufficiently close to the mark to yield trustworthy results of a general character. Future revisions of the reference dates will doubtless change materially the reference-cycle measures for some single cycles or single series, but the broad results portrayed by our average measures of cyclical behavior are practically certain to stand.[72] The force of this observation will be clarified in the course of the tests of our technique carried through in subsequent chapters.

72 This, on the whole, has been our experience as the reference dates have been revised or brought forward, and the average reference-cycle measures recomputed.