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Appendix A
The Development and Role of the National Bureau of Economic Research's Business Cycle Chronologies

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1. Defining Business Cycles

Business cycles consist of recurrent sequences of expansions, downturns, contractions, and upturns in a great number of diverse economic activities. These movements are both sufficiently diffused and sufficiently synchronized to create major fluctuations in comprehensive aggregates of employment, production, real income, and real sales. They are as a rule asymmetric in that expansions typically exceed contractions in size and duration. (In earlier history, however, the differences in duration were relatively small and irregular, as we will show below.) Of course, in any secularly growing economy, expansions must necessarily be on the average larger than contractions. It is a rare business cycle that does not contain a visible element of growth.

Persistent and pervasive fluctuations of this type are characteristic of the course of industrial economies with large sectors of private enterprise and markets relatively unconstrained by government. They have accompanied the development of modern capitalism in the Western world. The first systematic accounts are over a hundred years old (Juglar 1862). Authoritative studies date the phenomenon back at least to the late eighteenth century.

As a rule, several years are required for the cumulative processes of business expansion and contraction to complete a round from peak to peak or from trough to trough. But business cycles, though recurrent, are in their directly observable manifestations nonperiodic, unlike the

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cycles of the seasons.[1] Indeed, they vary considerably in duration and as well as in intensity and scope, and they do so in ways that appear to be largely unsystematic and unpredictable.

Seasonal movements, which are periodic but often quite variable in amplitude and incidence over the calendar year, may obscure the cyclical developments to an observer of current changes in individual time series. In addition, short erratic movements are likewise continually present in most economic indicators, and they too frequently impede the contemporaneous reading of business cycle signals. Historically, however, and looking across data representing many different variables, business cycles can be clearly distinguished from the other fluctuations in that they are usually *larger, longer,* and *more widely diffused.* Seasonal movements typically run their course within a year; most isolated random events also have repercussions of similar or shorter duration. Thus it is business cycles that usually dominate changes in the economy over spans of several years, just as seasonal and other shorter variations dominate many changes over spans of a few weeks or a few months. The developments across decades are, to be sure, primarily the work of forces of secular growth—rising population, labor force, and physical capital, as well as gains in productivity attributable to technological, educational, and organizational improvements. However, business cycles and long trends can and do interact in varied and subtle ways (about which more later).

A succinct definition of business cycles, first formulated in the 1920s and revised in the 1940s, runs as follows:

> Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; the sequence of changes is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximating their own.[2]

This working definition, in substantially its present form, has been in use at the National Bureau of Economic Research for over fifty years and is currently employed by the NBER to identify and date the United States business cycle. These dates are widely accepted by government,

1. The term "cycles" is often applied to measurable and recurrent but nonperiodic fluctuations in sciences other than economics, as noted by Wesley Mitchell, who refers to sunspot cycles that "varied in length from 7 to 17 years since 1788" (see his introduction to Thorp 1926, 32–33).

2. Burns and Mitchell 1946, 1; for the earlier version, see Mitchell 1927, 468.

academic, and business analysts. The definition served as the basis for the NBER's pre–World War II business cycle chronologies for England, France, and Germany as well as the United States. With a modest adjustment to allow activity to be measured relative to its long-run trend, the definition has been used to develop "growth cycle" chronologies for many countries. It has surely passed a severe test of time, considering all the far-reaching changes in the structure of modern industrialized economies and the character of contemporary business cycles.

The concept of "aggregate economic activity" is purposely vague, yielding to the recognition that what matters is the evolution over time of a vector of many diverse activities that are not readily reducible to any single aggregate.[3] The reasons are in part economic: for example, in times past when prices fluctuated cyclically around a relatively stable level, GNP in current dollars was often a more sensitive indicator than GNP in constant dollars; but in the recent era of long-persisting inflation the opposite is generally the case. Business cycles involve multidimensional processes, in which quantities and prices, stocks and flows, outputs and inputs, real, monetary, and financial variables all tend to participate, albeit with many timing and amplitude differentials and at varying rates. The definition properly stresses that the expansions and contractions occur with rough synchronism in "many economic activities" (and, we would add, in a fair number of activities generally regarded as "noneconomic" as well). The high cyclical conformity or coherence of numerous variables, that is, the wide diffusion or pervasiveness of business cycles, was and remains their common and most salient characteristic.

Statistical considerations are also important in this context. It is simply a fact that no single comprehensive measure of the nation's economic activity is available monthly or quarterly for a long historical period. Whether the aggregates refer to output, income, expenditures, or employment, they individually lack sufficient comparability of coverage and sufficient solidity of estimation over long stretches of time. It seems best therefore to rely on the evidence from a number of comprehensive indicators rather than any single one. Particular attention needs to be paid to the comovement of the economic variables, taking account of any systematic timing differences among them. This

3. The term itself entered the definition in 1946; in Mitchell 1913 and 1927 there is less apparent emphasis on overall aggregates and more on the collective concept of "a species of fluctuations in the economic activities of organized communities" or in "activities which are systematically conducted on a commercial basis" (1927, 488). The development of the national income and product accounts between 1927 and 1946 is of course highly relevant here.

also helps to reduce the risk of drawing erroneous inferences from data containing measurement errors and biases owing to changes in the quality of the information.

In addition to being pervasive, business cycles are also persistent; that is, the expansions and contractions are congeries of serially correlated as well as cross-correlated movements in many activities. The requirement that business cycles not be "divided into shorter cycles of similar character with amplitudes approximating their own" has in practice meant that no rise or decline in aggregate output, employment, and such is recognized as a cyclical movement unless it is at least as large as the smallest expansion or contraction in the historical record. Beyond that, no quantitative specifications are imposed upon either the amplitude or the scope of the cycles.

The only numerical limits mentioned refer to the duration of a full cycle (expansion and contraction), and they are broad: from more than a year to ten or twelve years. Thus the range of admissible fluctuations is wide, accommodating short and long, weak and strong cycles. There is no recognition of any systematic distinctions in these respects: unlike some other contemporary scholars (Schumpeter 1939; Hansen 1941, 1951; R. A. Gordon 1952), Burns and Mitchell (1946, chaps. 10 and 11) found no cogent reasons to differentiate a priori between "minor" and "major" or between "Kitchin" and "Juglar" cycles. However, this is a case of suspended judgment, not a definitive conclusion. Important differences clearly exist. For example, inventory investment plays a central role in the short "Kitchin" cycles, whereas fixed capital investment is more instrumental in the longer "Juglar" cycles. But such distinctions, and more generally all considerations of causality, are viewed as matters to be treated in further research, not as parts of a tentatively accepted definition. The long waves of fifty to sixty years hypothesized by Kondratieff in 1926 are quite different phenomena whose precise nature, and even existence, has not yet been widely accepted. Schumpeter's 1935 hypothesis that each such long wave contains six Juglar cycles of from nine to ten years' duration, while every Juglar is divisible into three Kitchin cycles of roughly forty months each, has also failed to be validated.

Burns and Mitchell make it clear that by their definition a mere slowing down or cessation of growth is not enough to qualify as a business cycle contraction: what is required is an absolute fall in "aggregate economic activity." Note, however, that this requirement has been modified in the recent work on "growth cycles." The rise and fall is not restricted to some limited measure of economic activity, for example, production in manufacturing or corporate profits, sufficient to define a business cycle: the latter must be clearly reflected in economywide aggregates of output and employment. Moreover, contrac-

tions as well as expansions are taken to be *cumulative* movements, which implies that they cannot be very short. Historical evidence indicates, for example, that a decline of less than six months could not reach the dimensions that would qualify it as a cyclical contraction, in particular a state in which a majority of industries experience falling demand (new orders or sales), production, and employment.

2. Early Views and Developments

Business cycles must be strictly distinguished from the various "crises" associated with foreign and civil wars, epidemics, bad harvests, earthquakes, isolated and transient monetary disorders, speculative "manias," and other episodic or random disturbances. Such events, whether due to acts of nature or of man, can disrupt the ordinary rhythm of economic life and cause much distress at any time, and they did so for ages under all forms of social organization. In contrast, business cycles, as defined above, "are found only in modern nations where economic activities are organized mainly through business enterprises and where individuals enjoy considerable freedom in producing, pricing, trading, and saving or investing" (Burns 1968, 228).

In the early literature on the subject, business cycles were often viewed as the natural way growth takes in modern capitalist economies. The latter have achieved historically unprecedented records of long-term development, for example, approximately fivefold gains in output per capita in the United States, France, and Germany.[4] Private enterprise thrived on and fostered advances in science and technology by seeking higher profits in surges of innovative investment. There was increasing division and specialization of labor as new techniques were introduced, new markets opened, new products discovered. Inevitably, this was associated with various frictions, difficult adjustments, and costly resource transfers in response to the (in large part unanticipated) shifts in demands and supplies.

Over decades, fairly smooth rising trends in population and labor force and much faster growth in the stock of reproducible capital can be broadly documented.[5] Improvements from the progress of knowl-

4. In the periods 1834–43 to 1963–67, 1831–40 to 1963–66, and 1850–59 to 1963–67, respectively. In the older developed countries of Europe and in Japan, population almost tripled and total output increased by a factor of at least fifteen over a century. These growth rates are far greater than those that can reasonably be assigned to earlier eras. See Kuznets 1971, 10–33 and 303–5; also, U.S. Department of Commerce, Bureau of the Census 1973.

5. For the United States between 1869 and 1955, for example, the net capital stock per member of the labor force is estimated to have grown at least 14% per decade, according to Kuznets 1971, 64–67. (This covers not only the very large component of business plant and equipment, but also housing, inventories, and claims against foreign countries.)

edge, new technologies, and new skills kept raising the *quality* and marginal productivity of human and tangible capital. This was sufficient to prevent a downward trend in the profitability of new investment that would otherwise have resulted, under the law of diminishing marginal returns, from the growing abundance of physical capital relative to labor and the nonreproducible natural resources.[6] Over shorter periods, however, profit totals, margins, and rates were continually undergoing large fluctuations induced by movements in sales, in product prices relative to wages and costs of materials and finance, in investment, and in the demand for and supply of credit. In turn, the rise and fall of profits, cash flow, and rates of return caused parallel movements in expectations of future profitability and hence in business decisions concerning production, employment, and investment. Changes in money and credit interacted with these general changes in economic expectations and activity.

To be sure, this is merely a brief, rough sketch of some trends in the classic era of industrialization, economic growth, and business cycles that originated about two hundred years ago in Britain and spread worldwide in the past century. Some observers placed more stress on real factors: cyclical innovations and growth spurts, recurrent overinvestment, imbalances between production of capital and consumer goods, intersectoral shifts. Others emphasized monetary processes: changes in the supply of bank credit, discrepancies between market and equilibrium interest rates. Still others paid special attention to the role of uncertainty and failure of foresight, interdependent expectations, and waves of errors of optimism and pessimism. Finally, the focus on cyclical changes in relative prices and profits is also compatible with important roles being played by other real forces as well as monetary and expectational variables. But it is generally correct to see the early theories of business cycles as mainly endogenous, that is, concentrating on the internal relations of the economic system rather than on the effects of external shocks; as multicausal, that is, concerned with interactions of the real, monetary, and expectational factors; and as dynamic, that is, incorporating elements of long-term growth into the analysis of short-term instability.[7]

The historical setting of business cycle phenomena suggests that they developed gradually along with the growing interdependence within

6. For a discerning discussion of the nature and working of this process, see Fellner 1956, esp. chaps. 4 and 8.

7. The characterizations above apply broadly to most of the principal contributors to the literature on business cycles in the period between the 1890s and the 1930s: Tugan-Baranovskii, Bouniatian, Aftalion, Pigou, Hawtrey, Robertson, Mitchell, Spiethoff, Schumpeter, and Hayek. For a review and references, see Haberler 1964 (originally published 1937).

and among the modern capitalist economies. The processes and institutions that mark this evolution include the buildup of fixed capital in progressively mechanized production requiring new sources of labor, energy, and materials; lessening of barriers to trade through advances in transportation and communications; and the spread of money transactions, banking and credit, and investment finance. As these factors moved the market economies of the Western world onto higher levels of economic interdependence, strongly diffused and persistent business fluctuations emerged where disjointed acts of nature and man-made disturbances had previously held sway. Since Juglar (1862) it has been widely recognized that the acute financial crises that happened from time to time are merely transitory events that cannot be well understood in isolation from the major problem of recurrent sequences of general expansions and contractions. Between 1894 and 1927, most of the leading scholars in the field (Tugan-Baranovskii, Aftalion, Mitchell, Spiethoff, Schumpeter) strongly endorsed and elaborated the conception of business cycles as a characteristic motion of the development of modern capital creating, money exchange, market oriented economies.

The dating of the earliest business cycles is imprecise and impeded by severe limitations of the available data. Schumpeter (1939, vol. 1, chap. 6.B, esp. pp. 223–24, 248–52) argued that capitalism goes "as far back as the element of credit creation" and that "there must have been also prosperities and depressions of the cyclical type" in the seventeenth and eighteenth centuries. But he concedes to the critics of this view that wars, poor harvests, and other "noncyclical catastrophies" played a much greater role in the preindustrialization era than in the cycles of the later period.[8]

A reference chronology of cyclical turning points for eighteenth-century England has been compiled from fragmentary but carefully assembled and explained chronicles and data by T. S. Ashton (1959), and some of his results are summed up in table A.1. Bad harvests occurred frequently, causing shortages for small farmers who produced grain mainly for themselves and their livestock and depressing real wages of industrial workers, the demand for textiles and other manufactured products, and output of commodities subject to excise duties. Government revenue would fall at the same time as the costs of provisions for the navy and army rose. The resulting deficits tended to raise the costs of borrowing and to decrease public confidence. More grain had to be imported at high prices, adversely affecting the balance of payments and the domestic supply of credit. Large farmers may

8. Schumpeter 1939, 1:224–25, refers to Mitchell and Spiethoff as having a "strong aversion to admitting that we may speak of cycles . . . before the end of the eighteenth century, while others, historians among them, do not hesitate to go far beyond that."

Table A.1 **Economic Fluctuations in England, 1700–1802**

Trough	Peak	Financial Crisis	Poor Harvest, Short Supplies of Grain	War
1700	1701	February–March 1701		War of the Spanish Succession since 1701
1702	1704	October–December 1704		
1706	1708	August–December 1710	1708–9	Victories in 1703–4, reverses in 1705
1712	1714	July–December 1715		Peace 1714
1716	1717–18	March 1719; August–December 1720		War with Spain, August 1718–20
1722	1724–25	October–December 1726	1725–26	Abolition of duties on British exports, 1722
1727	1728		1728–29	New War with Spain, 1727–29
1730	1733	October–December 1733		
1734	1738		1740–41	
1742	1743			War with France, 1744–48
1746	1746	September 1745–April 1746		
1748	1751			
1755	1761	June–December 1761	1757–58	Seven Years War, 1756–63
1763	1764	July–October 1763	1767–68	
1769	1771–72	June 1772–January 1773	1773–75	
1775	1777	January–April 1778		United States War of Independence 1776
1781	1783	September 1783–January 1784	1782–84	Franco-Spanish cooperation against British 1778–81; peace 1783
1784	1787	May–June 1788	1788–90	
1789	1792	November 1792–April 1793		
1794	1796	February–June 1797	1796–98	War with France, 1793–1802
1798	1799	August–November 1799	1799–1800	
1800	1802			

Source: Ashton 1959; see pp. 172–73 for cols. 1–3, chap. 2 for col. 4, and chap. 3 for col. 5.

have benefited from higher grain prices, but overall the bad consequences prevailed.

Although Britain fought her wars on the seas or on alien soil, they were recurrent, protracted, and often associated with other disasters such as epidemics and famines. They had large but mixed effects on overall economic activity, since the extent to which they curtailed civilian consumption or increased production varied greatly, as did the extent to which they were financed by taxation versus loans. The periods of decline, as dated by Ashton, lasted longer on average than the periods of growth.

In sum, weather and wars seem to account for much of the fluctuation in economic fortunes before the industrial revolution of the 1780s in Britain. But endogenous economic and financial processes played an increasingly important role as well. Bank notes and commercial paper provided an elastic supply of means of payment. Speculation in commodities and securities spread in prosperous times, and financial crises accompanied or followed most of the peak dates (Ashton 1959, chap. 5). Longer building cycles also persisted (ibid., chap. 4, and Lewis 1965). Rostow (1980, 37–38) compares the effects of bad harvests on real incomes and the balance of payments to the effects of oil price rises in 1973–74 and 1979 and the associated "supply side recessions" in the United States and elsewhere. It is interesting that the Ashton dates suggest a sequence of sixteen "cycles" with durations concentrated heavily between three and six years and averaging about five years (whether measured from trough to trough or from peak to peak). This is very close to the average length of the twenty-eight cycles identified in Great Britain in the NBER chronology for 1792–1932 (fifty-nine or sixty months; see Burns and Mitchell 1946, 371).

3. Business Annals, Historical Statistics, and Reference Dates

The first step the National Bureau of Economic Research took toward identifying historical business cycles shortly after its founding in 1920 was to compile comprehensive chronological records of changes in general economic conditions in the United States and England (1790–1925), France (1840–1925), Germany (1853–1925), Austria (1867–1925), and twelve other countries (1890–1925). These "business annals" were based on detailed studies of a large collection of official documents, reports by contemporary observers and students of economic history, periodicals, pamphlets, and books. The resulting volume by Willard Thorp (1926) lists several hundred sources. This was a major effort to extract year-by-year information on the spread, timing, duration, and intensity of past business fluctuations in the "great commercial nations," both old and new.

A second NBER project, also started in the early 1920s, was to collect statistical time series data on a variety of pertinent aspects of modern economies and subject them to a systematic analysis. These materials are more massive yet, and they are obviously necessary as a basis for more precise quantitative results as well as to check the inferences from the business annals. However, it is also useful to check the inferences from the statistical data with the aid of the reports of contemporary observers and other documents underlying the annals. In short, the two collections of materials provide evidence that is to a large extent complementary.

The time series cover shorter periods than the annals and are limited to four countries: the United States, England, France, and Germany. The available statistical record shrinks rapidly as one goes back into the 1800s, and the series extending to the earliest decades covered by the British and United States business annals are very scanty. The early data are predominantly annual, and their coverage and quality leave much to be desired. This makes the business annals indispensable for the study of the more distant past. Their materials enabled Thorp and the NBER staff to characterize each successive year covered according to the business conditions that prevailed. They called the generally good and bad times "prosperity" and "depression," respectively, and the generally shorter upper and lower transition periods "recessions" and "revivals," often attaching to these terms such adjectives as "brief," "slow," "rapid," "mild," "moderate," or "severe." Frequently the recessions and revivals were dated more closely within a year by such designations as "early" or "late," or even by months or seasons. Thus a single year would occasionally be classified into more than one of the four basic cycle phases.[9]

Although business annals and indexes of general economic activity may differ with respect to the mix of the processes covered, measurement errors, and so on, Mitchell (1927, 20–31) presents evidence of a generally close agreement between the two approaches on the fluctuations in the United States, 1875–1925, and in England, 1855–1914. Even for the earlier cycles, back to 1796, there is a fairly good correspondence between the recession dates based on the annals and those based on statistical series (mainly wholesale commodity prices).[10]

Table A.2 compares the annual reference dates for the British and United States business cycles between 1790 and 1858, as estimated by Thorp from annals (United States through 1833) and by Burns and Mitchell from annals and time series studies. A close correspondence

9. In addition to these aggregate characteristics, the annals also provide brief references to conditions in the main industries, markets, or sectors of each economy in year.

10. For a compilation of early data on United States business cycles, see Smith and Cole 1935, 3–84.

between the cycles in the two countries is indicated. Eight of the peak and three of the trough dates coincide. The degree of synchronization is particularly high for the (more precisely determined) dates of financial crises, in 1815, 1825, 1836–37, 1847, and 1857. The business annals for other countries available for the later period reinforce the finding that many cycles had an international sweep, as do the more recent and statistically firmer NBER chronologies for the United States, England, France, and Germany (see below). This again applies especially to the major cycles, which were often accompanied by financial crises or panics, as in 1873, 1893, 1907, and 1929.

According to the annual chronologies in table A.2, the durations of business cycles in this era comprising seven decades of the rise of modern capitalism and industrialization averaged about four and a half years in both Great Britain and the United States, whether measured from trough to trough or from peak to peak. The standard deviations of these estimates are close to two years. Most contractions did not exceed one or two years. Five of the fourteen identified cycles in either country fall into the early turbulent period of almost continuous wars that ended in 1815.

4. Monthly Business Cycle Chronologies: Problems and Procedures

For the United States and Britain since 1854, for France since 1865, and for Germany since 1879, sufficient evidence could be assembled by the NBER to permit estimation of monthly, as well as quarterly and annual, reference chronologies of business cycles. The work involved a painstaking collective effort. Burns and Mitchell (1946, 80) credit Kuznets for taking "a leading part in the preparation of the original set of reference dates" and Abramovitz, Moore, Shiskin, Garvy, and Walt Rostow, among others, for help in extending, revising, or criticizing the dates.

Before presenting and discussing the results (in the next section), we need to consider the main problems encountered in this research and the methods adopted to overcome them. The lack of a single sufficiently long and consistent measure of aggregate economic activity has already been noted. There is no doubt that no time series exists to fill this role for any country. This applies even to the recent periods covered by the quarterly data on national income and product accounts, as we will argue later. In any case, for the years before World War II these series are fragmentary and not very dependable.

In constructing their "reference scales" of business cycles after World War I, the NBER team could draw on monthly series of production in manufacturing and mining and of the number of factory employees. Before World War I, however, these data have a slender sampling basis

Table A.2 **Annual Reference Dates and Duration of Business Cycles in Great Britain and the United States, 1790–1858**

Dates of Peaks and Troughs by Years		Duration in Years			
				Full Cycle	
Trough (T) (1)	Peak (P) (2)	Contraction (P to T) (3)	Expansion (T to P) (4)	(T to T) (5)	(P to P) (6)
Great Britain					
	1792				
1793	1796	1	3		4
1797	1802	1	5	4	6
1803	1806	1	3	6	4
1808	1810	2	2	5	4
1811	1815	1	4	3	5
1816	1818	1	2	5	3
1819	1825	1	6	3	7
1826	1828	1	2	7	3
1829	1831	1	2	3	3
1832	1836	1	4	3	5
1837	1839	1	2	5	3
1842	1845	3	3	5	6
1848	1854	3	6	6	9
1855	1857	1	2	7	3
1858		1		3	
Mean duration (years)		1.3	3.3	4.6	4.6
Standard deviation (years)		0.7	1.5	1.5	1.8
United States					
1790	1796		6		
1799	1802	3	3	9	6
1804	1807	2	3	5	5
1810	1812[a]	3	1.5	6	4.5
1812[a]	1815	0.5	3	2	3.5
1821	1822	6	1	9	7
1823	1825	1	2	2	3
1826	1828	1	2	3	3
1829	1833	1	4	3	5
1834	1836	1	2	5	3
1838	1839	2	1	4	3
1843	1845	4	2	5	6
1846	1847	1	1	3	2
1848	1853	1	5	2	6
1855		2		7	
Mean duration (years)		2	2.6	4.6	4.4
Standard deviation (years)		1.5	1.5	2.4	1.6

Source: Great Britain: Burns and Mitchell 1946, table 16, p. 79; United States: 1790–1833, Thorp 1926, 113–26; 1834–55, Burns and Mitchell 1946, table 16, p. 78.

[a]In 1812 there is first a "brief recession," then a revival. The corresponding duration measures are based on the assumption that the recession occurred in the first half of the year, before the outbreak of the war with England (for evidence, see Thorp 1926, 42, 117).

and leave much to be desired. The series on bank clearings, wholesale prices, and interest rates are much longer. Historically, their cyclical sensitivity tended to be high, and the researchers found them on the whole very useful. Much reliance was placed, too, on a variety of indexes of business conditions, mostly in physical terms.

In sum, the historical records decrease in both volume and reliability when pushed back into the past. In general they are more satisfactory for the United States than for the foreign countries, but the reverse is true in a few cases involving the data for unemployment and interest rates (Burns and Mitchell 1946, 73–76).

Given the limitations of the individual indicators, the task of identifying and dating the historical business cycles required the analysis of both the voluminous business annals and numerous time series covering diverse activities. Before deciding *when* a peak (trough) occurred, it is necessary to determine *whether* the expansion (contraction) is of cyclical dimensions. To ascertain the critical characteristics of the scope and size of the economy's movement, there was no alternative to the laborious procedure of extracting common signals from the noisy indications of fallible data on a whole range of economic processes. This remains true even today when much better and more comprehensive cyclical indicator statistics are available, because the diffusion aspect of business cycles is as important as ever. It is still true as well, despite the great improvement in the data, that measurement errors are mostly unknown but often large. A careful comparative analysis of interrelated but independently derived time series can help reduce the effects of such errors on a business cycle chronology.

The working definition of business cycles cited above implies that peaks and troughs of time series representing a broad array of economic processes are not randomly interspersed but form alternating clusters. The clusters of peaks and troughs typically extend over many months, but it is also true that as a rule they show rather definite points of concentration (see, e.g., Moore 1961, chart 7-3 and pp. 196–202). These dates, around which most of the series reach their highest (lowest) local levels, indicate roughly the timing of the peaks (troughs) in the otherwise not observable "aggregate economic activity."

Of course, some series deserve more attention than others because they are more comprehensive, more significant economically, more adequate statistically, or more reliable with respect to their cyclical timing and conformity characteristics. Some series such as unemployment tend to rise in contractions and fall in expansions, hence they must be used in inverted form. Some series such as new orders for capital goods and construction contracts rise and fall early; others such as the volumes of business inventories and loans typically move late; still others move early at peaks and late at troughs, or vice versa. These

systematic differences in behavior, once known, can and should be taken into account in identifying and dating the generalized expansions and contractions—often by excluding them from the sample of series used in the procedure.

It should be clear that the monthly or quarterly dates of business cycle turns are of necessity uncertain estimates. No high degree of precision is generally possible here; the best achievable result is a chronology that is well supported by the most pertinent evidence one can obtain. But this is also a major result and worth much effort. A well-designed and well-tested chronology is a valuable tool in the analysis and understanding of business cycle phenomena, some of which at least are of prime interest to macroeconomic theory and policy. A common reference scale has many practical uses, one of them being to confer the advantage of economies of scale on the handling of large numbers of contemporaneous time series. As Burns and Mitchell said (1946, 70–71), "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." Other analytical uses of the business cycle chronologies, for international comparisons and the measurement of relative durations, amplitudes, and spread of cyclical movements, are illustrated below (fig. A.1 and tables A.4, A.6, and A.7).

5. The NBER Business Cycle Chronologies for 1854–1938

Table A.3 shows the monthly, quarterly, and annual lists of reference dates compiled by the NBER for the periods before World War II. The bulk of this information comes from Burns and Mitchell, as cited. Only a few of the dates, all referring to the United States cycles in 1919–38, were subsequently changed in light of additional and revised data. The resulting shifts were small: two dates were shifted by one month, and two were shifted by two months.

The quarterly and annual dates are necessary for working with time series cast in the corresponding time units, in particular where monthly data are not available, but the monthly dates are basic since only they permit observation of cyclical behavior in the essential detail (Burns and Mitchell 1946, 80–81). Hence the monthly dates control the others and should be given preference and used wherever possible.

If the monthly choice falls in the middle month of the quarter, that quarter is always taken as the quarterly reference date. If it falls on the first or third month, the quarterly turn is placed either in the quarter

containing the reference month or in the quarter adjacent to that month, according to the indications of a sample of important economic series measured by quarters (including monthly data converted to quarterly).

Annual records alone are a poor guide to dating, since they obscure some mild and short business cycles. Phases of twelve months or less that overlap two calendar years (mostly contractions) have been frequent, particularly in the United States since the 1870s. Independent annual dating can miss the short business cycles and combine two or even three of them into one, while producing only a rough one-to-one correspondence with the longer cycles in the monthly chronology. There is ample statistical evidence that this is a serious measurement problem (Burns and Mitchell 1946, chap. 6, esp. 262). Hence the adopted procedure is to set monthly reference dates first and then make the annual ones match them as well as possible. However, the annual turns are intended to identify the years in which the overall activity in the economy reached a high or a low point, and these years need not always coincide with those in which the corresponding *monthly* peaks or troughs fall. When the monthly date occurs early in the year t, the annual date may well be the year $t - 1$; similarly, when the monthly turn is late, the annual one will often be the year $t + 1$.

According to these chronologies, business cycles have indeed been recurrent but not periodic in each of the countries covered. Contractions ranged from 7 to 65 months in the United States, 6 to 81 months in Britain, 8 to 68 months in France, and 12 to 61 months in Germany. The corresponding ranges for expansion are 10 to 50, 8 to 64, 8 to 62, and 16 to 61 months. The shortest full-cycle durations (measured from peak to peak or from trough to trough) are 17 months for the United States and Great Britain, 24 months for France, and 34 months for Germany; the longest are 101, 135, 110, and 122 months, respectively.

However, these measures are based on rare outliers; there is considerably more of a central tendency among business cycles than they suggest. For example, declines lasting from 10 months to 2 years account for 67% (43 out of 64) of the business contractions recorded in table A.3. Expansions lasting 1½ to 3½ years represent 66% (42 out of 64) of all observations in this category. Full cycles lasting 2½ to 5½ years account for 64% (41 out of 64) of all cycles measured from trough to trough. These ranges contain half or more of the corresponding listings for each of the four countries covered.

It is important to note that business cycles have tended to be shorter in the United States than in the foreign countries. Thus the period 1854–1938 witnessed twenty-one United States cycles averaging four years and only sixteen British cycles averaging 5⅓ years. For 1879–1938, the comparison is as follows:

Table A.3 Business Cycle Chronologies and Durations to 1938

Dates of Peaks and Troughs				Duration in Months			
By Months and Quarters		By Calendar Years				Full Cycle	
Trough (T) (1)	Peak (P) (2)	Trough (T) (3)	Peak (P) (4)	Contraction (P to T) (5)	Expansion (T to P) (6)	T to T (7)	P to P (8)
			United States, 1854–1938				
December 1854:4	June 1857:2	1855	1856		30		
December 1858:4	October 1860:2	1858	1860	18	22	48	40
June 1861:3	April 1865:1	1861	1864	8	46	30	54
December 1867:1	June 1869:2	1867	1869	32	18	78	50
December 1870:4	October 1873:3	1870	1873	18	34	36	52
March 1879:1	March 1882:1	1878	1882	65	36	99	101
May 1885:2	March 1887:2	1885	1887	38	22	74	60
April 1888:1	July 1890:3	1888	1890	13	27	35	40
May 1891:2	January 1893:1	1891	1892	10	20	37	30
June 1894:2	December 1895:4	1884	1895	17	18	37	35
June 1897:2	June 1899:3	1896	1899	18	24	36	42
December 1900:4	September 1902:4	1900	1903	18	21	42	39
August 1904:3	May 1907:2	1904	1907	23	33	44	56
June 1908:2	January 1910:1	1908	1910	13	19	46	32
January 1912:4	January 1913:1	1911	1913	24	12	43	32
December 1914:4	August 1918:3	1914	1918	23	44	35	67
March 1919:1	January 1920:1	1919	1920	7	10	51	17
July 1921:3	May 1923:2	1921	1923	18	22	28	40
July 1924:3	October 1926:3	1924	1926	14	27	36	41
November 1927:4	August 1929:3	1927	1929	13	21	40	34
March 1933:1	May 1937:2	1932	1937	43	50	64	93
June 1938:2		1938		13		63	
			Averages				
Twenty-one cycles, 1854–1938							
Mean duration (months)				21	26	48	48
Standard deviation (months)				14	11	18	20
Thirty-five cycles, 1790–1938[a]							
Mean duration (months)				23	28	50	50
Standard deviation (months)				16	14	24	20

Great Britain, 1854–1938

December 1854/55:1	September 1857:4	1855	1857		33		
March 1858:1	September 1860:4	1858	1860	6	30	39	36
December 1862:4	March 1866:2	1862	1866	27	39	57	66
March 1868:2	September 1872:4	1868	1873	24	54	63	78
June 1879:2	December 1882:1	1879	1883	81	42	135	123
June 1886:2	September 1890:3	1886	1890	42	51	84	93
February 1895:1	June 1900:3	1894	1900	53	64	104	117
September 1901:4	June 1903:2	1901	1903	15	21	79	36
November 1904:4	June 1907:2	1904	1907	17	31	38	48
November 1908:4	December 1912:1	1908	1913	17	49	48	66
September 1914:3	October 1918:2	1914	1917	21	49	70	70
April 1919:2	March 1920:2	1919	1920	6	11	55	17
June 1921:2	November 1924:4	1921	1924	15	41	26	56
July 1926:3	March 1927:2	1926	1927	20	8	61	28
September 1928:3	July 1929:3	1928	1929	18	10	26	28
August 1932:3	September 1937:3	1932	1937	37	61	47	98
September 1938:3		1938		12		73	
			Averages				
Sixteen cycles, 1854–1938							
Mean duration (months)				26	37	63	64
Standard deviation (months)				19	18	29	33
Twenty-nine cycles, 1790–1938[a]							
Mean Duration (months)				22	39	60	62
Standard deviation (months)				16	18	24	28

Table A.3 (continued)

Dates of Peaks and Troughs				Duration in Months			
By Months and Quarters		By Calendar Years				Full Cycle	
Trough (T) (1)	Peak (P) (2)	Trough (T) (3)	Peak (P) (4)	Contraction (P to T) (5)	Expansion (T to P) (6)	T to T (7)	P to P (8)
			France, 1865–1938				
December 1865	November 1867	1865	1866		23		
October 1868	August 1870	1868	1869	11	22	34	33
February 1872	September 1873	1871	1873	18	19	40	37
August 1876	April 1878	1876	1878	35	20	54	55
September 1879	December 1881	1879	1882	17	27	37	44
August 1887	January 1891	1887	1890	68	41	95	109
January 1895:1	March 1900:1	1894	1900	48	62	89	110
September 1902:3	May 1903:2	1902	1903	30	8	92	38
October 1904:3	July 1907:3	1904	1907	17	33	25	50
February 1909:1	June 1913:3	1908	1913	19	52	52	71
August 1914:3	June 1918:2	1914	1917	14	46	66	60
April 1919:2	September 1920:3	1918	1920	10	17	56	27
July 1921:3	October 1924:3	1921	1924	10	39	27	49
June 1925:3	October 1926:3	1925	1926	8	16	47	24
June 1927:3	March 1930:1	1927	1930	8	33	24	41
July 1932:3	July 1933:3	1932	1933	28	12	61	40
April 1935:1	June 1937:2	1935	1937	21	26	33	47
August 1938:3		1938		14		40	
			Averages				
Mean duration (months)				22	29	51	52
Standard deviation (months)				16	15	23	25

			Germany, 1879–1932				
February 1879:1	January 1882:1	1878	1882		35		
August 1886:3	January 1890:1	1886	1890	55	41	90	96
February 1895:1	March 1990:2	1894	1900	61	61	102	122
March 1902:1	August 1903:3	1902	1903	24	17	85	41
February 1905:1	July 1907:2	1904	1907	18	29	35	47
December 1908:4	April 1913:1	1908	1913	17	52	46	69
August 1914:3	June 1918:2	1914	1917	16	46	68	62
June 1919:2	May 1922:2	1919	1922	12	35	58	47
November 1923:4	March 1925:2	1923	1925	18	16	53	34
March 1926:2	April 1929:2	1926	1929	12	37	28	49
August 1932:3		1932		40			77
			Averages				
Mean duration (months)				27	37	64	63
Standard deviation (months)				18	14	24	29

Source: National Bureau of Economic Research.

Note: For a basic statement of the method of determining business cycle peaks and troughs, see Burns and Mitchell 1946, chap. 4. Some of the dates shown there (p. 78) have been revised.

[a]Combines the observations in table A.2 for 1790–1855 (converted from annual to monthly durations) with observations in this table for the subsequent cycles through 1938.

	United States	Great Britain	France	Germany
Number of cycles (trough to trough)	17	13	14	10
Mean duration (months)	48	65	53	64

Figure A.1 uses a schematic form to compare the timing of business cycle peaks and troughs in the four countries. It suggests a fairly high overall degree of correspondence between the chronologies, as shown by the following summary.

	Peaks		Troughs	
	Number	Percent	Number	Percent
Matched turns				
All four countries	44	62	48	64
Three countries	18	25	18	24
Two countries	2	3	2	3
Unmatched turns	7	10	7	9
Total	71	100	75	100

A closer look at the diagram makes it clear that much of the time, notably during the four decades 1879–1919, the conformity between the business cycles in the three European countries was very close, while the United States followed a different pattern of shorter and more frequent fluctuations. In the earlier years the movements were generally less synchronized, in part because of the annual dating for France and Germany. In the 1920s and 1930s, the European countries were much less in phase with each other than in the preceding forty years, but the degree of conformity between their cycles and those in the United States increased.[11]

6. On the Dependability of Historical Reference Dates

In the early United States business cycles, the average length of contractions was close to that of expansions, whereas more recently expansions have become much longer. This is clearly so according to the following measures of mean duration of the cyclical phases dated by the NBER.

11. Cf. Morgenstern 1959, chap. 2, for a discussion of the international timing of business cycles, 1879–1938.

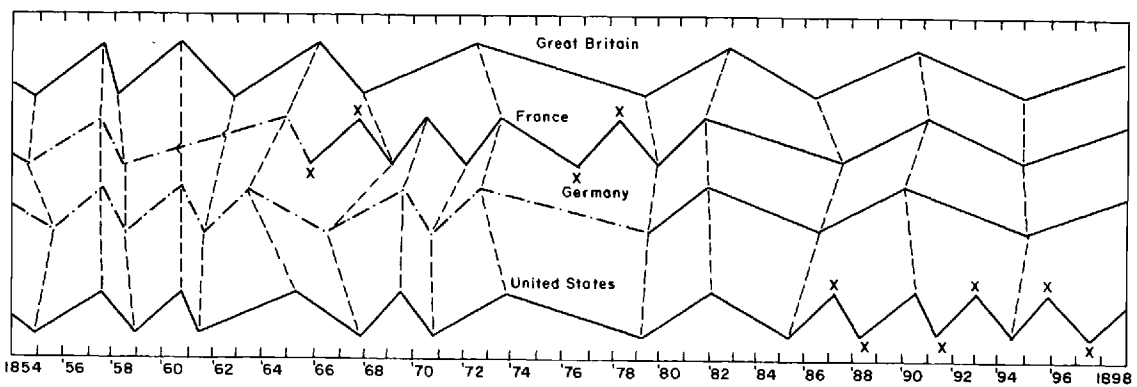
	1834–55	1857–82	1885–99	1900–1918	1919–37	1948–82
Number of cycles	5	5	5	5	5	8
Expansion, months ($\bar{E}$)	26	31	22	26	26	45
Contraction, months ($\bar{C}$)	24	28	19	20	19	11
Ratio, $\bar{E}/\bar{C}$	1.1	1.1	1.2	1.3	1.4	4.1

Fluctuations of trend-adjusted aggregates in the post–World War II period show alternating phases of high and low growth that have similar durations (e.g., in 1948–75 for the United States, these phases lasted on the average twenty and eighteen months, respectively). In such "growth cycles" (see section 8 below) the near symmetry is persistent and understandable because the fluctuations are measured from a long-run upward trend laid flat, as it were; that is, the growth element is eliminated. In contrast, the secular trend is retained in the measurement of business cycles as defined by the NBER, so that stages of less than average but positive growth are included in expansions and only the periods of sufficiently large and broad *absolute declines* qualify as contractions.

Accordingly, one might expect business cycle expansions to be significantly longer than contractions on the average over long periods of economic development. If so, one might also be somewhat surprised by, and suspicious of, the near equality of the early $\bar{E}$ and $\bar{C}$ measures listed above.

These views are not compelling: conceivably, the averages could reflect the dominance of lengthy periods of slow decline among the contractions and of short periods of rapid growth among the expansions. But it is also possible that some of the historical reference dates refer to growth cycles rather than business cycles, that is, that some of the phases designated as actual declines in the overall economic activity represent merely phases of low (less than the trend) growth rates. The limitations of data available for the identification of the early cycles, and the consequent reliance on business annals and selected indexes of business conditions, might well have produced a certain bias in this direction. This applies in particular to the period 1834–52, the segment of the NBER reference cycle chronology for which there are no comprehensive measures or indexes of economic activity without trend adjustments.

A partial reappraisal of the evidence for the United States confirms that generally the contractions in NBER chronology do represent cyclical declines in either real income and output, or money income and spending, or both the real and the nominal aggregates (Zarnowitz 1981). It is important to note that, historically, both groups of variables deserve a thorough consideration. In the recent era of inflation, the cycles


Great Britain
France
Germany
United States
1854
'56
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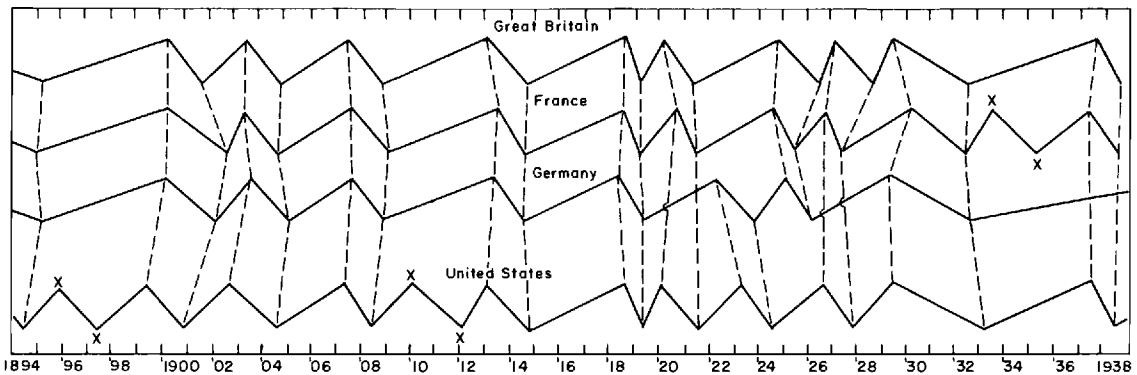

Fig. A.1 Timing of reference cycles for four countries and matched turning points, 1854–1938. For each country, the lines connect the dates of business cycle peaks (upper turning points) and troughs (lower turning points). Thus the upward-sloping segments of each country line represent expansions; the downward-sloping segments, contractions. The dashed links between the country lines connect the matched peaks or troughs for two or more countries. The sign x denotes an unmatched turn. For France before 1865 and for Germany before 1879, the reference dates are annual. They are plotted at midpoint of the given calendar year and connected with dashed and dotted lines. All other reference dates are monthly and are connected with solid lines. German annual turning points 1855–1963 estimated from Hoffman 1965 by Rostow 1980, 38–39. All other dates are from Burns and Mitchell 1946, 78–79.

are mainly in the real aggregates, but in the past, when the price level fluctuated and long periods of deflation occurred, the cycles were often more pronounced in the nominal aggregates.

Nevertheless, a few episodes are doubtful. All of these go back to the nineteenth century. (The 1918–19 and 1926–27 contractions have been questioned by some investigators, but there is sufficient evidence in favor of their inclusion.)[12] The most dubious is the 1845–46 phase, but 1869–70, 1887–97, and 1899–1900 are also uncertain. Given the limited information on hand, it seems impossible to refute the hypothesis that these were periods of below-average growth rather than actual delines. Fewer doubts attach to some other minor contractions (Zarnowitz 1981, 494–505).

If the four periods just listed were treated as growth cycle slowdowns instead of business cycle contractions, the differences between the $\bar{E}$ and $\bar{C}$ duration measures would be substantially increased. The tabulation below illustrates these effects.

	1834–55		1854–1919	
	Five Cycles	Four Cycles	Sixteen Cycles	Thirteen Cycles
Expansion, months ($\bar{E}$)	26	36	27	37
Contraction, months ($\bar{C}$)	24	27	22	23
Ratio, $\bar{E}/\bar{C}$	1.1	1.3	1.2	1.6

Comparisons of the NBER chronology and other chronologies disclose very few discrepancies and provide no good reasons for revisions (see references in note 12). Comparisons with indexes of business activity (both trend adjusted and, after 1882, unadjusted) also point to a very high degree of correspondence between the cycles identified by the NBER and the consensus of fluctuations revealed by the best available information from time series data. Indeed, in most cases there is a one-to-one agreement between the NBER dates and the cyclical turning points in these indexes.[13]

12. Eckler 1933 and Gilbert 1933 omit the 1918–19 contraction; Axe and Houghton 1931, Hubbard 1936, and Ayres 1939 omit the 1926–27 contraction. See Burns and Mitchell 1946, table 27 and pp. 107–10, for a comparison of the NBER chronology with these and two other independently compiled chronologies (Kitchin 1923 and Persons 1931). The available data indicate that 1918–19 is appropriately viewed as a sui generis end of the war recession along with the similar short 1945 episode. The 1926–27 recession is marginal but also supported by the preponderance of the evidence. See also Zarnowitz 1981, 504.

13. See Burns and Mitchell 1946, chart 10 and pp. 111–13, for the check provided by the "standard pattern of short-term fluctuations in American business activity" from Frickey 1942. Also see Zarnowitz 1981, tables 3 and 4 and pp. 494–504, for comparisons with several indexes of trade and industrial activity and deflated bank clearings.

Table A.4 provides some evidence on how well the United States chronology fits the cyclical movements in business activities phase by phase. It shows the percentages of series rising during each expansion and falling during each contraction for eighteen indicators of commercial and industrial activity (production, trade, orders, bank clearings) and twenty-eight indicators of prices and financial activity (commodity and security prices, interest rates, bonds and shares traded, business failures). The series that tend to move countercyclically are inverted, and allowance is made for fixed leads or lags—the timing characteristics of the indicators. The diffusion measures are predominantly high: about half of the phase percentages in columns 1–3 exceed 90, three-quarters exceed 80, and practically all exceed 50. However, the percentages tend to be higher for the series that rise during expansions than for those that decline during contractions (compare the entries in lines 1–20 and 30–49). The overall averages range from 80% to 97% (lines 25 and 54). Thus the represented variables are shown to have participated with substantial regularity in the successive business cycle expansions and contractions dated by the NBER, exhibiting a generally high level of cyclical conformity.

The diffusion ought to be positively correlated with the amplitude of cyclical fluctuations, that is, those movements that are more widely spread among the various sectors, industries, and processes of the economy would also be expected to be larger in terms of the most comprehensive measures of economic activity that are available. Table A.4 provides some evidence that this is indeed so. Here amplitudes are measured by the average of three trend-adjusted indexes of business activity that cover the entire period 1854–1933 (col. 4) and by the average of four indexes without trend adjustments that begin in the 1870s or later (col. 5). For either set of measures, the phases that rank higher according to the amplitudes tend to have larger diffusion, that is, higher proportions of series conforming with respect to the direction of the economy's movement (see the sections on "Averages," lines 21–29 and 50–58, in the table).

We conclude that the NBER historical reference dates of United States business cycles receive strong support from the phase-by-phase behavior of both the individual indicators and the weighted combinations of various time series (indexes of business activity). However, it is important to keep in mind the obvious fact that the chronologies cannot be made more reliable than the available information permits. The true cyclical movements in the economy at large cannot be observed directly without comprehensive, nonduplicative measures of aggregate economic activity, but it is only for the most recent decades that the required statistical data exist. The series used as proxies for such measures could either underestimate or overestimate the true

Table A.4 **Measures of Diffusion and Amplitude of Business Cycles, United States, 1854–1933**

Line Number	Business Cycle Expansion[a]	Percentage of Series Rising: Commercial and Industrial Activity[b] (1)	Percentage of Series Rising: Prices and Financial Activity[c] (2)	Percentage of Series Rising: All Series Covered[d] (3)	Average Percentage Rise (Rank): Three Trend Adjusted Indexes[e] (4)	Average Percentage Rise (Rank): Four Indexes Not Adjusted for Trend[f] (5)
1	1854–57	100	67	75	12.3 (2)	
2	1858–60	100	86	88	16.8 (8)	
3	1861–65	100	89	90	18.1 (11)	
4	1867–69	100	67	79	6.9 (1)	
5	1870–73	88	60	72	18.4 (12)	
6	1879–82	100	93	97	27.6 (18)	58.1 (15)
7	1885–87	94	92	93	22.7 (14)	49.6 (11)
8	1888–90	100	55	76	16.6 (6)	34.2 (5)
9	1891–93	89	54	67	16.3 (5)	20.8 (1)
10	1894–95	100	75	85	25.3 (15)	37.6 (8)
11	1897–99	94	96	96	26.6 (17)	54.4 (13)
12	1900–1902	100	82	89	14.2 (4)	36.8 (7)
13	1904–7	100	96	98	20.2 (13)	45.8 (9)
14	1908–10	94	96	96	25.6 (16)	47.5 (10)
15	1912–13	100	86	91	13.6 (3)	24.0 (2)
16	1914–18	94	89	91	29.8 (19)	54.4 (12)
17	1919–20	100	89	93	17.9 (10)	30.9 (3)
18	1921–23	100	82	89	38.0 (20)	54.5 (14)
19	1924–26	100	71	83	17.8 (9)	34.5 (6)
20	1927–29	94	75	83	16.7 (7)	31.6 (4)

			Averages			
1854–1929[g]						
21	Smallest (ranks 1–5)	98	71	80	12.7	
22	Ranks 6–10	99	75	85	17.2	
23	Ranks 11–15	96	82	88	20.9	
24	Largest (ranks 16–20)	96	91	94	29.5	
25	All	97	80	87	20.1	
1879–1929[h]						
26	Smallest (ranks 1–5)	97	71	82		28.3
27	Ranks 6–10	99	84	90		40.4
28	Largest (ranks 11–15)	96	90	93		54.2
29	All	97	82	88	21.9	41.0

		Percentage of Series Declining			Average Percentage Decline (Rank)	
Line Number	Business Cycle Contraction[a]	Commercial and Industrial Activity[b] (1)	Prices and Financial Activity[c] (2)	All Series Covered[d] (3)	Three Trend Adjusted Indexes[e] (4)	Four Indexes Not Adjusted for Trend[f] (5)
30	1857–58	100	100	100	21.0 (10)	
31	1860–61	100	100	100	14.1 (6)	
32	1865–67	100	83	85	11.4 (4)	
33	1869–70	40	89	71	7.9 (1)	
34	1873–79	50	100	79	26.9 (15)	
35	1882–85	88	100	94	27.9 (16)	21.1 (11)
36	1887–88	89	68	78	11.2 (3)	10.2 (4)
37	1890–91	83	79	80	17.0 (9)	11.0 (5)
38	1893–94	94	100	98	30.7 (18)	28.8 (14)
39	1895–97	89	79	83	24.3 (14)	17.4 (8)
40	1899–1900	67	64	65	14.4 (7.5)	9.9 (3)

Table A.4 (continued)

Line Number	Business Cycle Contraction[a]	Percentage of Series Declining: Commercial and Industrial Activity[b] (1)	Percentage of Series Declining: Prices and Financial Activity[c] (2)	All Series Covered[d] (3)	Average Percentage Decline (Rank): Three Trend Adjusted Indexes[e] (4)	Average Percentage Decline (Rank): Four Indexes Not Adjusted for Trend[f] (5)
41	1902–4	94	79	85	14.4 (7.5)	14.8 (6)
42	1907–8	94	100	98	29.5 (17)	27.0 (12)
43	1910–12	78	82	80	12.0 (5)	8.4 (2)
44	1913–14	94	88	90	23.2 (13)	18.3 (9)
45	1918–19	83	57	67	22.0 (12)	18.6 (10)
46	1920–21	100	100	100	34.7 (19)	27.1 (13)
47	1923–24	83	94	89	21.8 (11)	17.0 (7)
48	1926–27	67	68	67	9.3 (2)	8.4 (1)
49	1929–33	100	100	100	75.1 (20)	
			Averages			
1857–1933[g]						
50	Smallest (ranks 1–5)	75	78	76	10.4	
51	Ranks 6–10	89	84	86	16.2	
52	Ranks 11–15	80	83	82	23.6	
53	Largest (ranks 16–20)	95	100	98	39.6	
54	All	85	86	85	22.4	
1882–1927[h]						
55	Smallest (ranks 1–5)	77	72	74		9.6
56	Ranks 6–10	89	87	83		17.2
57	Largest (ranks 11–14)	94	84	98		26.0
58	All	86	83	84	20.9	17.0

Sources: Cols. 1–3: Burns and Mitchell 1946, tables 23 and 24, pp. 102–3; cols. 4 and 8: Moore 1961, vol. 1, table 3.6, pp. 104–5; col. 5: Zarnowitz 1981, table 4, p. 500, based on NBER files. Number of series covered: col. 1, 17–18 (before 1879, eight or fewer); col. 2, 15–28 (before 1879, eleven or fewer); col. 3, 32–46 (before 1879, nineteen or fewer).

[a]Identified by years of turning points in the NBER monthly reference chronology (table 3).

[b]Includes ten indexes of general business activity, four series on orders for investment goods, two on production, and two on foreign trade. For details, see Burns and Mitchell 1946, table 21, pp. 98–99.

[c]Includes nine indexes of general or wholesale prices, six series on wholesale prices for individual commodities, nine series on volume of trade, prices, and yields in money and security markets, and four series on business failures. See Burns and Mitchell 1946, table 21, pp. 98–99.

[d]Includes the forty-six series in the groups in notes b and c.

[e]Since 1879, the figures are averages based on three seasonally and trend adjusted indexes: American Telephone and Telegraph Company index of business activity, index of industrial production and trade constructed by Warren M. Persons and continued by the Barron's Publishing Company, and Ayres's index of business activity compiled by the Cleveland Trust Company. Before 1879, the entries are for Ayres's index alone. The rise from the specific cycle trough to specific cycle peak in each index is taken as a percentage of the average level of the index during the full specific cycle (trough to trough), and the fall from specific peak to specific trough is taken as a percentage of the same base. The amplitude measures are ranked from smallest (1) to largest (20). Because the indexes are trend adjusted, the contraction amplitudes are approximately the same, on average, as the expansion amplitudes.

[f]The indexes, adjusted for seasonal variations but not for trends, are: (1) Bank clearings (1875–1918) and bank debits (1919–30). NBER data (Macaulay 1938, table 30, pp. A289–96) deflated by Carl Snyder's index of general price level; (2) Axe/Houghton index of trade and industrial activity (1879–1929) furnished by A. W. Axe and Company, New York; (3) Babson index of physical volume of business activity (1889–1929) furnished by Babson's Reports, Inc.; (4) American Telephone and Telegraph Company (1899–1929), Chief Statistician's Division (a confidential release, 6 September 1944). For details, see Zarnowitz 1981, 499–502.

[g]These expansions and contractions are divided into four groups according to the ranks recorded in col. 4: the mildest ones (ranks 1–5), the most vigorous or severe (ranks 16–20), and two intermediate groups. The entries are simple arithmetic means of the corresponding figures in the columns above.

[h]These expansions and contractions are divided into three groups according to the ranks recorded in col. 5: the mildest ones (ranks 1–5), the intermediate (ranks 6–10), and the most vigorous or severe (ranks 11–15 for expansions, 11–14 for contractions). The entries are simple arithmetic means of the corresponding figures in the columns above.

movements. Perhaps the greater risk is that of overestimation because the data appear to represent the cyclically sensitive sectors of the economy, notably manufacturing, better than they do the other sectors. Still, the NBER-designated phases provide about as good approximations to the historical incidence of business expansions and contractions as the data allow. On the other hand, considerable uncertainty attaches to the precise dates of some of the early reference turns.

In comparison with the United States dates, Burns and Mitchell (1946, 113) assessed the NBER chronologies for the foreign countries as being "at least tolerable, if not equally good, approximations," while listing a few particular doubts and difficulties.[14] Independent compilations of turning points show on the whole good agreement on the identification of the cycles; some more serious discrepancies arise because of differences in how the cycles are defined and divided into phases.[15]

7. The United States Business Cycle Chronology since 1933

Since World War II the NBER's work in this field has been directed toward maintaining the United States business cycle chronology along the lines previously established and developing the concept of a growth cycle chronology and applying it to the United States and other major industrial countries. In this section we discuss the chronology of the recent United States business cycles, and the following section is devoted to growth cycles in fourteen countries.

Table A.5 gives the monthly, quarterly, and annual business cycle dates for the United States from 1933 to 1982, together with the durations of contractions, expansions, and full cycles.[16] Ten cycles have occurred in the past 49 years, or about one every five years. In the preceding 143 years, from 1790 to 1933, there were thirty-four cycles, or about one every four years. Hence the frequency of cycles has diminished somewhat. But the biggest change that the chronology re-

14. The German contraction 8/1903 to 2/1905 is acknowledged to be "dubious," and the French dates in the 1860s and 1870s, and also after 1932, are in need of careful reexamination.

15. Matthews 1959, 215–26 stresses the longer cycles of seven to ten years' duration, especially for Great Britain. Friedman and Schwartz 1982, 74, omit the 1901 trough and the 1903 peak recognized in the NBER chronology for Britain. In his German chronology published in 1955, Spiethoff 1955 skips the contraction of 1903–4 about which Burns and Mitchell had some doubts of their own (on German chronologies, see Bry 1960, app. B, 474–80). These authors concentrate on the characterization of annual data.

16. The pre–World War II monthly NBER chronologies presented in table A.3 include the cycles through the 1938 troughs, for the United States and other countries. But a new epoch in the United States economic history and policy opened after the traumatic experience of the Great Contraction in 1929–33, and we find it instructive to cover in table A.5 all subsequent reference dates and durations. (Note that, therefore, the individual dates for the 1933–37–38 cycle are included in both tables.)

Table A.5 Business Cycle Chronologies and Durations, United States, 1933–82

Dates of Peaks and Troughs				Duration in Months[a]			
By Months and Quarters		By Calendar Years				Full Cycle	
Trough (T) (1)	Peak (P) (2)	Trough (T) (3)	Peak (P) (4)	Contraction (P to T) (5)	Expansion (T to P) (6)	T to T (7)	P to P (8)
March 1933:1	May 1937:2	1932	1937		50		
June 1938:2	February 1945:1	1938	1944	13	80W	63	93
October 1945:4	November 1948:4	1946	1948	8W	37	88	45
October 1949:4	July 1953:2	1949	1953	11	45W	48	56
May 1954:2	August 1957:3	1954	1957	10W	39	55	49
April 1958:2	April 1960:2	1958	1960	8	24	47	32
February 1961:1	December 1969:4	1961	1969	10	106W	34	116
November 1970:4	November 1973:4	1970	1973	11W	36	117	47
March 1975:1	January 1980:1	1975	1979	16	58	52	74
July 1980:3	July 1981:3	1980	1981	6	12	64	18
November 1982:4		1982		16		28	
			Averages				
Ten cycles, 1933–82							
Mean duration (months)				11	49	60	59
Standard deviation (months)				3	27	26	31
Thirty cycles, 1854–1982							
Mean duration (months)				18	33	51	50
Standard deviation (months)				12	20	21	23
Forty-four cycles, 1790–1982							
Mean duration (months)				20	33	52	51
Standard deviation (months)				15	20	24	22

Source: National Bureau of Economic Research.

[a]W = wartime expansion and following contraction.

veals is the shift in the length of contractions compared with expansions. In the period for which only annual dates are available, 1790 to 1855, contractions averaged about twenty-four months, expansions thirty-one months. Then from 1854 to 1933, when monthly dates are available, the average durations are twenty-two and twenty-five months respectively. But since 1933 the average contraction has lasted only eleven months, while expansions have averaged forty-nine months (twenty-seven months when the wartime expansions are excluded).

In other words, since the depression of the early 1930s, the contraction phase of the business cycle has been reduced by about a year, while the expansion phase has been extended by two years. Before 1933, recessions lasted almost as long as expansions. Since then, expansions have been more than four times as long as recessions: the economy has been in recession less than 20% of the time.

Recessions have become not only shorter but also much more uniform in length. Using the standard deviation as a measure, the variability among contractions in 1790–1855 was eighteen months; in 1854–1933, fourteen months; and in 1933–82, only three months. In this sense, recessions have become more predictable. On the other hand, expansions have become less uniform in length. Between 1790 and 1855 the standard deviation of durations of expansions was eighteen months, the same as for the contractions. From 1854 to 1933, the standard deviation of expansions was nine months. But from 1933 to 1983, it was twenty-seven months. Expansions have become nine times as variable as contractions.

It is not our purpose here to investigate the reasons for this shift in variability, or for the shift in the length of expansions relative to contractions. The latter appears to be connected with the rising trend of prices since the 1930s, which in turn may be related to the stronger effort of government to control recessions (See Moore 1983, chap. 15). But this is a worthy subject for further study.

The length of a period of rise or fall in aggregate economic activity is one of the criteria considered in establishing the business cycle chronology. The size and scope of the movement are also considered. Measures of these dimensions for all the expansions between 1949 and 1982 are given in table A.6, and all the contractions since 1920 are covered in table A.7. Measures similar to these, but somewhat more extensive, have been used by the NBER staff in deciding what intervals should be classified as expansions or as contractions and what the peak and trough dates should be.[17]

17. The NBER sources for the successive United States reference dates in the post–World War II period are Moore 1961, 1:104–5 (through 1958); NBER *Annual Reports* for 1961 (Moore, 38–41) and 1962 (Moore, 65–66); supplement to *National Bureau Report 8*, May 1971 (Fabricant); NBER *Annual Reports* for 1975 (Moore, 23–26; Zarnowitz and

Study of the tables will reveal one development that led to a shift in this procedure during the 1960s. During the three expansions 1949–60 and during the five recessions 1923–38 and 1948–49, GNP in current dollars moved in wider swings than did GNP in constant dollars. Prices moved up and down with the business cycle, enhancing the current dollar swings. Since 1960, apart from a small one-quarter decline in 1982, current dollar GNP has not declined at all. Whereas before 1960 the current dollar aggregates for GNP, sales, and income had figured importantly in the determination of the business cycle chronology, since the 1960s they have played no role at all. As long as the rate of inflation remains persistently positive, this is likely to continue.

The tables make it clear that not only have recessions become shorter, they have become milder as well. None of the recessions since 1948 have approached the Great Depression in depth, nor have they come close to the major depressions of 1920–21 or 1937–38. All have been in a class either with the fairly sharp recession of 1923–24 or the mild recession of 1926–27. The tables record considerable "progress toward economic stability" (Burns 1960).

A word should be said about the problem of identifying business cycles contemporaneously. How soon a peak or trough can be recognized depends partly upon how rapidly the economy descends from the peak or rises from the trough. It also depends upon one's ability and willingness to make forecasts—for example, that a decline in the several measures of aggregate activity will last as long and go as deep as in previously recognized recessions, and that the declines will be widespread. Since the NBER's decisions on dates have not depended on forecasts, turns in the business cycle have been recognized only with a lag. For example, the trough date for the most recent recession, November 1982, was determined by the National Bureau of Economic Research in July 1983. Even that involved a presumption that the recovery then under way would continue and ultimately develop the characteristics of a business cycle expansion.

We have recently developed one way to reduce this recognition lag in a paper on sequential signals of recession and recovery (Zarnowitz and Moore 1982). The signals are based upon smoothed short-run growth rates in the composite leading and coincident indexes published by the

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Boschan, 26–29) and 1977 (Zarnowitz and Boschan, 34–38). A comprehensive report on the 1973–76 developments, which shows in detail how the chronology for this period was derived, is Zarnowitz and Moore 1977. Since 1980, the turning points for the United States are identified by the NBER's Committee on Business Cycle Dating; on the composition and work of the committee and the analysis behind its decisions concerning the recession and recovery of 1980, see Zarnowitz and Moore 1981. The NBER United States chronology is published in the United States Commerce Department's monthly report on cyclical indicators entitled *Business Conditions Digest* (*BCD*).

Table A.6 **Measures of the Duration, Vigor, and Diffusion of Expansions, 1949–82**

	Business Cycle Trough/Peak							Average, Seven Expansions
	Oct. 1949 Jul. 1953	May 1954 Aug. 1957	Apr. 1958 Apr. 1960	Feb. 1961 Dec. 1969	Nov. 1970 Nov. 1973	Mar. 1975 Jan. 1980	Jul. 1980 Jul. 1981	
Duration (months)								
Business cycle	45	39	24	106	36	58	12	46
GNP, current dollars	42	39	30	—[a]	—[a]	—[a]	—[a]	n.a.
GNP, constant dollars	48	39	24	105	45	60	15	48
Industrial production	45	35	21	104	43	48	12	44
Nonfarm employment	44	31	23	109	47	59	12	46
Increase (percent)[b]								
GNP, current dollars	43.8	24.0	16.3	—[a]	—[a]	—[a]	—[a]	n.a.
GNP, constant dollars	28.1	13.2	11.3	49.2	17.1	24.3	4.4	21.1
Industrial production	50.1	23.7	26.0	78.9	25.9	37.4	9.6	35.9
Nonfarm employment	17.7	9.1	7.5	33.7	11.9	19.1	1.9	14.4
Unemployment rate								
Minimum	2.5	3.6	4.9	3.3	4.5	5.5	7.1	4.5
Decrease	−5.3	−2.3	−2.4	−3.6	−1.4	−3.3	−0.6	−2.7

Rate of increase (percent per year)								
GNP, current dollars	10.9	6.9	6.2	—[a]	—[a]	—[a]	—[a]	n.a.
GNP, constant dollars	6.4	3.9	5.5	4.7	4.3	4.4	3.5	4.7
Industrial production	11.4	7.6	14.1	6.9	6.6	8.3	9.6	9.2
Nonfarm employment	4.5	3.4	3.8	3.2	2.9	3.6	1.9	3.3
Diffusion (percent)								
Nonfarm industries, maximum percentage with rising employment, with date when maximum was reached[c]	100 Jul. 1950	95 May 1955	92 Jan. 1959	91 Dec. 1965	86 Mar. 1972	85 Feb. 1977	73 Oct. 1980	89

Source: U.S. Department of Commerce, U.S. Department of Labor, Board of Governors of the Federal Reserve System, National Bureau of Economic Research.

Note: n.a. = not available.

[a]No cycle.

[b]Percentage change from trough month or quarter in the series to the peak month or quarter, over the periods shown. For the unemployment rate the minimum figure is the lowest for any month during the expansion, and the decreases are from the highest month to the lowest, in percentage points.

[c]Based on changes in employment over six-month spans, centered on the fourth month of the span, in 30 nonagricultural industries, 1948–59; 172 industries, 1960–71; 186 industries, 1972–81.

Table A.7 Measures of Duration, Depth, and Diffusion of Recessions, 1920–82

	Business Cycle Peak/Trough					
	January 1920 July 1921	May 1923 July 1924	October 1926 November 1927	August 1929 March 1933	May 1937 June 1938	February 1945 October 1945
Duration (months)						
Business cycle	18	14	13	43	13	8
GNP, current dollars	n.a.	6	12	42	9	6
GNP, constant dollars	n.a.	3	3	36	6	n.a.
Industrial production	14	14	8	36	12	27
Nonfarm employment	n.a.	n.a.	n.a.	43	11	22
Depth (percent)[b]						
GNP, current dollars	n.a.	−4.9	−3.0	−49.6	−16.2	−11.9
GNP, constant dollars	n.a.	−4.1	−2.0	−32.6	−13.2	n.a.
Industrial production	−32.4	−17.9	−7.0	−53.4	−32.4	−38.3
Nonfarm employment	n.a.	n.a.	n.a.	−31.6	−10.8	−10.1
Unemployment rate						
Maximum	11.9[c]	5.5[c]	4.4[c]	24.9[c]	20.0	4.3
Increase	+10.3[c]	+2.6[c]	+2.4[c]	+21.7[c]	+9.0	+3.4
Diffusion (percent)						
Nonfarm industries, maximum percentage with declining employment, and date when maximum was reached[d]	97 September 1920	95 April 1924	71 November 1927	100 June 1933	97 December 1937	n.a.

	Business Cycle Peak/Trough							
	November 1948 October 1949	July 1953 May 1954	August 1957 April 1958	April 1960 February 1961	December 1969 November 1970	November 1973 March 1975	January 1980 July 1980	July 1981 November 1982
Duration (months)								
Business cycle	11	10	8	10	11	16	6	16
GNP, current dollars	12	12	6	3	—[a]	—[a]	—[a]	3
GNP, constant dollars	6	12	6	9	6	15	3	6
Industrial production	15	9	13	13	13	9	16	16
Nonfarm employment	13	14	14	10	8	6	4	17
Depth (percent)[b]								
GNP, current dollars	−3.4	−1.9	−2.8	−0.6	—[a]	—[a]	—[a]	−0.4
GNP, constant dollars	−1.5	−3.2	−3.3	−1.2	−1.0	−4.9	−2.3	−3.0
Industrial production	−10.1	−9.4	−13.5	−8.6	−6.8	−15.3	−8.5	−12.3
Nonfarm employment	−5.2	−3.5	−4.3	−2.2	−1.5	−2.9	−1.4	−3.1
Unemployment rate								
Maximum	7.8	5.9	7.3	6.9	5.9	8.8	7.7	10.7
Increase	+4.5	+3.4	+3.7	+2.0	+2.6	+4.3	+2.2	+3.6
Diffusion (percent)								
Nonfarm industries, maximum percentage with declining employment, with date when maximum was reached[d]	90 February 1949	87 March 1954	88 September 1957	80 October 1960	80 May 1970	88 January 1975	77 April 1980	79 August 1982

Source: U.S. Department of Commerce, U.S. Department of Labor, Board of Governors of the Federal Reserve System, National Bureau of Economic Research. For a fuller version of this table, see Fabricant 1972, 100–110.

Note: n.a. = not available.

[a]No decline.

[b]Percentage change from the peak month or quarter in the series to the trough month or quarter, over the invervals shown. For the unemployment rate the maximum figure is the highest for any month during the contraction, and the increases are from the lowest month to the highest, in percentage points.

[c]The maximum figures are annual averages for 1921, 1924, 1928, and 1933 (monthly data not available). Increases, in percentage points, are for 1919–21, 1923–24, 1926–28, and 1929–33.

[d]Since 1948 based on changes in employment over six-month spans, centered on the fourth month of the span, in 30 nonagricultural industries, 1948–59; 172 industries, 1960–71; 186 industries, 1972–82. Before 1948 based on cyclical changes in employment in 41 industries.

Department of Commerce. When these growth rates reach certain predetermined levels, a preliminary signal of a peak or trough occurs. If they reach another set of levels, a second signal is passed, and so on with a third and final signal. Safeguards against false signals are built into the system. Historical tests have shown that the signals would have identified each of the United States business cycle peaks and troughs since 1949 without undue delays or false signals. One of the potential uses for the system is to activate or deactivate countercyclical policies.

8. Growth Cycle Chronologies

A modification of the concept of business cycles employed in the chronologies discussed above was developed by Mintz at the NBER in the 1960s (Mintz 1969, 1974). The growth cycle represents a fluctuation around the long-run growth trend of a nation's economy, that is, a trend adjusted business cycle. Chronologies based upon this concept, using the classical business cycle definition cited above but applying it to data from which long-run trends have been eliminated, are shown in figure A.2 and table A.8. The dates mark the approximate time when aggregate economic activity was farthest above its long-run trend level (peak) or farthest below its long-run trend level (trough).

The specific procedures used to establish these chronologies, initiated by Moore and Klein at the NBER in 1973, are as follows:

1. Measures of aggregate economic activity such as industrial production, gross national product, personal income, employment, unemployment, and sales of goods and services are expressed in physical units or in constant prices, seasonally adjusted, with their long-run trend removed. The trend fitting procedure, called the phase average trend, provides a fairly flexible growth trend that is substantially free of the shorter-term cyclical movements in the series (Boschan and Ebanks 1978).

2. For each of the series above, computer selected peaks and troughs are derived from the deviations of the seasonally adjusted data from the growth trend. The program for turning point selection is described in Bry and Boschan (1971).

3. These turning points are visually inspected and sometimes altered by shifting the date, omitting the turn, or adding another turn. These changes are relatively rare, affecting perhaps 5% of the turning points.

4. Median dates in the clusters of peaks and troughs formed by all the series mentioned above are computed.

5. A composite index based on the series above before their adjustment for trend is constructed, the growth trend is removed from

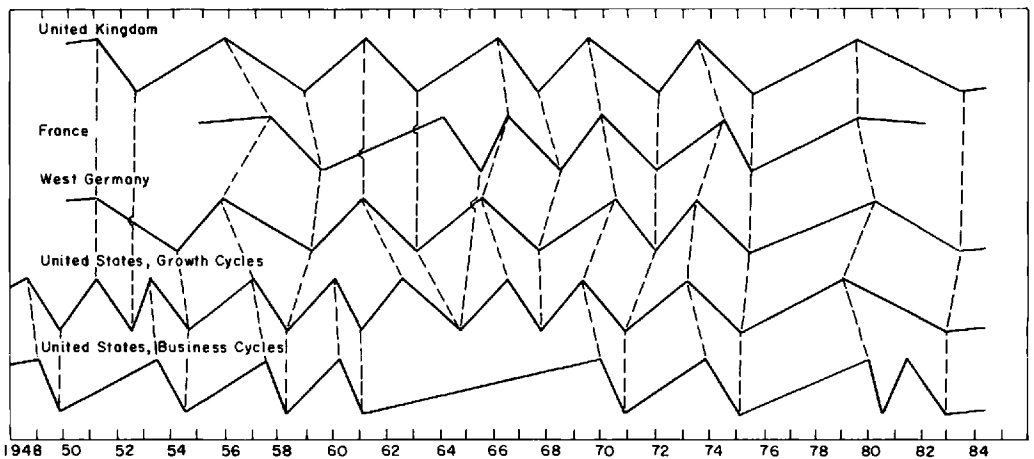

Fig. A.2 Timing of growth cycles for four countries and matched turning points, 1948–83.

Table A.8 Growth Cycle Peak and Trough Dates, Fourteen Countries, 1948–83

Peak or Trough	United States	Australia	Belgium	Canada	France	Italy	Japan	South Korea
P	7/48							
T	10/49			5/50				
P	3/51	4/51		4/51				
T	7/52	11/52		12/51				
P	3/53			3/53			12/53	
T	8/54			10/54			6/55	
P	2/57	8/55		11/56	8/57	10/56	5/57	
T	4/58	1/58		8/58	8/59	7/59	1/59	
P	2/60	8/60		10/59				
T	2/61	9/61		3/61				
P	5/62			3/62	2/64	9/63	1/62	
T	10/64			5/63	6/65	3/65	1/63	
P							7/64	
T							2/66	
P	6/66	4/65	10/64	3/66	6/66			
T	10/67	1/68	7/68	2/68	5/68			8/66
P	3/69	5/70	9/70	2/69	11/69	8/69	6/70	1/69
T	11/70	3/72	7/71	12/70	11/71	9/72	1/72	3/72
P	3/73	2/74	7/74	2/74	5/74	4/74	11/73	2/74
T	3/75	10/75	10/75	10/75	6/75	5/75	3/75	6/75
P		8/76		5/76		12/76		7/76
T		10/77		12/77		10/77		
P	12/78		6/79	10/79	8/79	2/80	2/80	
T				5/80				
P		6/81		6/81				
T	12/82	5/83		11/82			6/83	

Source: For the United States, National Bureau of Economic Research. For other countries, Center for International Business Cycle Research.

Note: The four-, seven-, and eight-country chronologies are based on composite indexes of output, income, employment, and trade, weighted by each country's GNP in 1970, expressed in United States dollars. The four countries are the United Kingdom, West

Nether-lands	Sweden	Switzer-land	Taiwan	United Kingdom	West Ger-many	Countries		
						Four	Seven	Eight
		2/50						
7/50		3/51		3/51	2/51			
6/52		2/53		8/52				
					2/54			
10/56		6/57		12/55	10/55	5/57	5/57	2/57
5/58		9/58		11/58	4/59	2/59	2/59	5/58
								2/60
								2/61
3/61		4/64		3/61	2/61	3/61	3/61	2/62
2/63			6/63	2/63	2/63	2/63	2/63	2/63
							11/64	
11/65	2/65		4/65	2/66	5/65	3/66		3/66
8/67	7/67	5/68	8/67	8/67	8/67	5/68	5/68	10/67
11/70	7/70	5/70	11/68	6/69	5/70	5/70	6/70	8/69
8/72	7/72	1/71	1/71	2/72	12/71	2/72	2/72	8/71
8/74	6/74	4/74	12/73	6/73	8/73	7/74	11/73	10/73
7/75		8/75	2/75	8/75	5/75	8/75	11/75	5/75
9/76			6/76					
11/77	7/78		7/77					
12/79			8/78	6/79	2/80	2/80	2/80	2/80
			10/82	6/83	7/83		4/83	2/83

Germany, France, and Italy. The seven countries include these four plus Canada, Japan, and Australia, and the eight countries include the United States as well. The chronologies begin at different dates because appropriate data are not available earlier. The absence of a recent date does not necessarily mean that a turn has not occurred.

the index, and turning points are selected in the deviations from trend.

6. The clusters of dates, the median dates, and the composite index dates are inspected, and a decision is made on which monthly date best represents the consensus. These dates are the growth cycle peaks and troughs.

Comparisons of growth cycle and business cycle chronologies show that the number of growth cycles during a given period usually exceeds the number of business cycles, because slowdowns that sometimes occur during long business cycle expansions become actual contractions in the trend-adjusted figures. In the United States, for example, such slowdowns occurred in 1951–52, 1962–64, and 1966–67, interrupting the long business cycle expansions from 1949 to 1953 and from 1961 to 1969. Hence growth cycles are, on average, shorter than business cycles. Another difference is that peaks in the growth cycle usually occur some months before the corresponding peaks in the business cycle, because activity usually slows before a business cycle peak is reached. Growth cycle and business cycle troughs tend to be more nearly simultaneous. As a result of these differences, expansions and contractions are more nearly symmetrical, in both duration and amplitude, in growth cycles than in business cycles. Also, the variability in duration and in amplitude is more nearly uniform between expansions and contractions of growth cycles. The international connections among growth cycles since World War II seem to be about as pervasive as those among business cycles before the war (compare figs. A.1 and A.2).

The continuing public concern with slowdowns in growth, some of which turn into declines in aggregate economic activity and some of which do not, justifies further attention to this concept of the business cycle. So also does the growing concern with the international spread of economic fluctuations, since slowdowns in one country may become substantial declines in another. The widening use of both business cycle and growth cycle chronologies in many countries testifies to the value of this well-tested tool for research and public understanding (see Klein and Moore 1985).

References

Ashton, T. S. 1959. *Economic fluctuations in England, 1700–1800*. Oxford: Clarendon Press.

Axe, E. W., and R. Houghton. 1931. Financial and business cycles, manufacturing growth and analysis of individual indicators, 1883–1930. *Annalist*, 16 January, 150–51.

Ayres, Leonard P. 1939. *Turning points in business cycles*. New York: Macmillan.

Boschan, Charlotte, and Walter W. Ebanks. 1978. The phase-average trend: A new way of measuring growth. In *Proceedings of the Business and Economic Statistics Section*. Washington, D.C.: American Statistical Association.

Bry, Gerhard. 1960. *Wages in Germany, 1871–1945*. New York: National Bureau of Economic Research.

Bry, Gerhard, and Charlotte Boschan. 1971. *Cyclical analysis of time series: Selected procedures and computer programs*. New York: Columbia University Press.

Burns, Arthur F. 1960. Progress towards economic stability. *American Economic Review* 50 (March): 1–19.

———. 1968. Business cycles. In *International Encyclopedia of the Social Sciences* 2:226–45. New York: Macmillan.

Burns, Arthur F., and Wesley C. Mitchell. 1946. *Measuring business cycles*. New York: National Bureau of Economic Research.

Cloos, George W. 1963a. How good are the National Bureau's reference dates? *Journal of Business* 36 (January): 14–32.

———. 1963b. More on reference dates and leading indicators. *Journal of Business* 36 (July): 352–64.

Eckler, A. Ross. 1933. A measure of the severity of depressions, 1873–1932. *Review of Economic Statistics* 15 (February): 75–81.

Fabricant, Solomon. 1972. The recession of 1969–1970. In *The business cycle today*, ed. Victor Zarnowitz. New York: National Bureau of Economic Research.

Fellner, William. 1956. *Trends and cycles in economic activity*. New York: Henry Holt.

Frickey, Edwin. 1942. *Economic fluctuations in the United States*. Cambridge: Harvard University Press.

Friedman, Milton, and Anna J. Schwartz. 1982. *Monetary trends in the United States and the United Kingdom: Their relation to income, prices, and interest rates, 1867–1975*. Chicago: University of Chicago Press.

Gilbert, Donald W. 1933. Business cycles and municipal expenditures. *Review of Economic Statistics* 15 (August): 140–41.

Gordon, Robert Aaron. 1952. *Business fluctuations*. New York: Harper.

Haberler, Gottfried. 1964. *Prosperity and depression*. Cambridge: Harvard University Press. Originally published 1937.

Hansen, Alvin H. 1941. *Fiscal policy and business cycles*. New York: W. W. Norton.

———. 1951. *Business cycles and national income*. New York: W. W. Norton.

Hoffman, Walther G. 1965. *Das Wachstum der deutschen Wirschaft seit der Mitte des 19. Jahrhunderts*. Berlin: Springer-Verlag.

Hubbard, Joseph B. 1936. Business declines and recoveries. *Review of Economic Statistics* 18 (February): 16–23.

Juglar, Clément. 1862. *Des crises commerciales et de leur retour périodique en France, en Angleterre et aux Etats Unis*. Paris: Guillaumin.

Kitchin, Joseph. 1923. Cycles and trends in economic factors. *Review of Economic Statistics* 5 (January): 10–16.

Klein, Philip A., and Geoffrey H. Moore. 1985. *Monitoring growth cycles in market-oriented countries*. Cambridge, Mass.: Ballinger.

Kuznets, Simon. 1971. *Economic growth of nations*. Cambridge: Belknap Press of Harvard University Press.

Lewis, John P. 1965. *Building cycles and Britain's growth*. London: Macmillan; New York: St. Martin's Press.

Matthews, R. C. O. 1959. *The trade cycle*. Cambridge: Cambridge University Press.

Mintz, Ilse. 1969. *Dating postwar business cycles: Methods and their application to Western Germany, 1950–67*. New York: Columbia University Press.

———. 1974. Dating United States growth cycles. *Explorations in Economic Research* 1, no. 1:1–113.

Mitchell, Wesley C. 1913. *Business cycles*. Berkeley: University of California Press.

———. 1927. *Business cycles: The problem and its setting*. New York: National Bureau of Economic Research.

Moore, Geoffrey H., ed. 1961. *Business cycle indicators*. Princeton: Princeton University Press.

———. 1967. What is a recession? *American Statistician* 21 (October) 16–19. (Reprinted, with more recent figures and references added, in Moore 1983.)

———. 1983. *Business cycles, inflation, and forecasting*. 2d ed. Cambridge, Mass.: Ballinger.

Morgenstern, Oskar. 1959. *International financial transactions and business cycles*. New York: National Bureau of Economic Research.

Persons, Warren M. 1931. *Forecasting business cycles*. New York: John Wiley.

Rostow, W. W. 1980. Cycles in the fifth Kondratieff upswing. In *The business cycle and public policy, 1929–80*, 34–66. A compendium of papers submitted to the Joint Economic Committee, Congress of the United States. Washington, D.C.: Government Printing Office.

Schumpeter, Joseph A. 1939. *Business cycles: A theoretical, historical, and statistical analysis of the capitalist process*. 2 vols. New York: McGraw-Hill.

Smith, Walter B., and Arthur H. Cole. 1935. *Fluctuations in American business, 1790–1860*. Cambridge: Harvard University Press.

Spiethoff, Arthur. 1955. *Die wirtschaftlichen Wechsellagen: Aufschwung, Krise, Stockung*. 2 vols. Zurich: Polygraphischer Verlag.

Trueblood, Lorman C. 1961. The dating of postwar business cycles. In *Proceedings of the Business and Economic Statistics Section.* Washington, D.C.: American Statistical Association.

U.S. Department of Commerce, Bureau of the Census. 1973. *Long term Economic Growth, 1860–1970.* Washington, D.C.: Government Printing Office.

Zarnowitz, Victor. 1963a. On the dating of business cycles. *Journal of Business* 36 (April): 179–99.

———. 1963b. Cloos on reference dates and leading indicators: A comment. *Journal of Business* 36 (October): 461–63.

———. 1981. Business cycles and growth: Some reflections and measures. In *Wirtschaftstheorie und Wirtschaftspolitik: Gedenkschrift für Erich Preiser,* ed. W. J. Mückl and A. E. Ott, 475–508. Passau: Passavia Universitätsverlag.

Zarnowitz, Victor, and Geoffrey H. Moore. 1977. The recession and recovery of 1973–76. *Explorations in Economic Research* 4, (Fall): 472–557.

———. 1981. The timing and the severity of the recession of 1980. [NBER] *Economic Reporter* (Spring), 19–21.

———. 1982. Sequential signals of recession and recovery. *Journal of Business* 55 (January): 57–85. (Reprinted and updated in Moore 1983.)