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9 Major Changes in Cyclical Behavior

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In the long stretch of time covered by business cycles, the economies of the industrialized world have undergone many profound changes of structure, institutions, and modes of operation. Business cycles have continued to have much in common as the most durable and pervasive form of short-term motion of these economies, but they have also changed significantly. This study seeks to identify and analyze some of these changes. We concentrate on the longer and relatively well-established developments in the United States.

Sections 9.1 and 9.2 review some historical facts and hypotheses concerned with types of change in cyclical behavior. Next we take a long-run view of the durations of cyclical phases, note the shifts in the relative length of expansions and contractions (9.3), and relate them to changing trends in prices (9.4). Section 9.5 examines the amplitudes of cyclical movements in production and employment during the past hundred years. There follows an analysis of structural shifts in employment and their cyclical effects (9.6); trends and cyclical changes in unemployment and labor force participation (9.7); and the consequences for the business cycles of the altered composition of personal income, reflecting the expansion of government, transfer payments, and so on (9.8). A discussion of the relationship between growth and variability of economic change (9.9) completes this part of our report.

The remaining sections deal with changes in particular categories of cyclical indicators. Of special interest here is the behavior of wholesale or producer prices (9.10) and interest rates (9.11). Also, we examine

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the consistency of timing of the leading, coincident, and lagging indicators over as long a period as the data allow (9.12). Finally, we present our conclusions and suggestions for further research.

9.1 Business Cycles and Growth: Background and Some Hypotheses

Business cycles, defined as recurrent sequences of persistent and pervasive expansions and contractions in economic activities, are at least as old as the modern industrialization and growth processes in the principal capitalist countries. The earliest evidence of their presence, from British and United States business annals and statistics, reaches back into the eighteenth century.

The impressively high long-term growth rates of the era are well documented by the series of decade averages that reveal upward trends in employment, output, capital, productivity, and per capita consumption (see, e.g., Kuznets 1971; U.S. Department of Commerce 1973). However, over shorter periods, growth of the major private enterprise economies was very uneven. Each decade witnessed at least one contraction of aggregate economic activity in each country, but more typically there were two and sometimes three. This refers to all countries covered by the business annals (Thorp 1926) and the NBER business cycle chronologies (Burns and Mitchell 1946).[1] Most of these setbacks were mild, but some were serious. A contraction was always followed by an expansion, which as a rule consisted of recovery to the highest levels previously attained and a phase of net growth ending in a new record high ("peak") of activity. Only on a few occasions did a peak fail to exceed the preceding peak. Similarly, successive troughs usually reached higher levels, except when a particularly weak recovery or deep depression occurred. Thus overall growth was achieved through expansionary spurts punctuated every few years by mild but generalized slowdowns or recessions and at longer irregular intervals by major depressions.

During this epoch the economies, societies, and political systems involved changed profoundly in many respects. There is substantial agreement among those who have studied the subject intensively that business cycles are "a product of culture . . . found only in modern nations where economic activities are organized mainly through business enterprises and where individuals enjoy considerable freedom in

1. The annals begin in 1790 for England and the United States, in 1840 for France, in 1853 for Germany, in 1867 for Austria, and in 1870 for twelve other countries on four continents. They end in 1925 (Thorp 1926) and in 1931 (Thorp 1932). The NBER chronologies start in 1792, 1834, 1840, and 1866 for Great Britain, the United States, France, and Germany, respectively. See appendix A to this volume for more detail.

producing, pricing, trading, and saving or investing" (Burns 1968, 228).[2] It is therefore plausible to look for important changes in business cycles as a result of the changes in the structure of production, markets, institutions, and policies.

It is also possible to argue that the influence runs partly in the opposite direction and to see in the development of business cycles a major instrument for changes in the economy and society. Marx predicted a trend toward intensification of crises as capital/labor ratios increase, workers are displaced and pauperized, and profit rates fall, but his predictions were belied by the spread of prosperity and the capacity of capitalism and democracy first to survive and then to avoid severe depressions and bouts of high unemployment. Keynes worried about whether investment would absorb savings at full employment in countries growing in wealth, where capital accumulation lowers the return to investors. Hansen moved further, expecting weaker booms and deeper slumps to result from reduced opportunities for investment and increased propensity to save in "mature economies" with slower population growth. History dealt as harshly with these new "secular stagnation" hypotheses as it had with the earlier ones.[3] Yet they are revived in various forms whenever sluggish business conditions prevail for some time, as in the recent period of so-called stagflation.

Conversely, in times of substantial stability and growth, such as the mid-1920s and 1960s in the United States, the idea tends to gain ground that business cycles are becoming "obsolete" or are being "ironed out" by better public and business policies. In 1921–29 the Federal Reserve System "took—and perhaps even more was given—credit for the generally stable conditions that prevailed, and high hopes were placed in the potency of monetary policy as then administered" (Friedman and Schwartz 1963, 240). In the mid-1960s, many economists believed that

2. In contrast, seasonal (daily and annual) cycles, although influenced by custom—for example, the timing of holidays—are in large measure part and parcel of the natural environment of man. Centrally directed or collectivist economies suffer from various types of instability induced partly by nature (e.g., variations in harvest) and partly by government and societal actions (e.g., political purges; planning errors; imposition of, resistance to, and relaxation of price and other controls). In reaction to such disturbances, the overall growth rates of these systems can vary widely over time, but such fluctuations are very different from business cycles, just as closed centralized economies are fundamentally unlike open market or "mixed" economies.

3. Consider also the classical theories of stationary state and the law of historically diminishing returns, as well as the Malthusian population principle, in the light of the great increase in the average standard of living in the densely populated countries of Western Europe and Japan. A hundred years after Malthus, Veblen anticipated a convergence of modern economies to a chronic state of mild depression. Keynes sympathized with the intuitive underconsumption hypotheses of Malthus and Hobson as forerunners of his theory of deficient effective demand. For appraisals of current interest, see Mitchell 1927, chap. 9; Keynes 1936, chap. 23; Haberler 1964 (1937), chap. 5; and Burns and Mitchell 1946, 382–83.

the new use of discretionary fiscal policy was on its way to "dethroning the cyclical model" (Heller 1966; see also Gordon 1969, 26–29).

9.2 Three Types of Change

It is useful to distinguish three types of change in the cyclical behavior of the market-oriented economies: long-term or secular trends; discontinuous or episodic changes; and cyclical changes. The hypotheses noted in section 9.1 envisage a gradual intensification or a gradual moderation of business cycles and hence concern the first type. These are presumably irreversible changes or trends that can be projected. The second type are temporary changes observed in particular periods. They may or may not continue and may or may not be reversed.

The third type are "cycles of cycles." Here the NBER-designated business cycles are viewed as subdivisions of longer major cycles or as mixtures of several distinct types. Four patterns, named for the economists who have investigated them in detail, are found in the literature:

1. The *Kondratieff* (about forty-eight to sixty years). These "long waves" have been associated with large movements in the level of prices and perhaps also with major technological innovations, but they do not show up in the volumes of production and consumption. Too few of such swings have been observed to prove or disprove their existence conclusively.

2. The *Kuznets* (fifteen to twenty-five years). These cycles have been associated with construction of buildings and transport facilities (highways, rail lines, etc.), growth of population and labor force, urban development, and business formation. Here there is more supportive evidence of a historical nature.

3. The *Juglar* (about seven to ten years). These are the "major" business cycles, such as the Great Depression of the 1930s, that have received a great deal of attention in academic literature.

4. The *Kitchin* (about three to four years). These "minor" or "forty-month" business cycles are often related to fluctuations in inventory investment.

Schumpeter (1939, vol. 1, chap. 5) developed the much discussed scheme of three Kitchins per Juglar and six Juglars per Kondratieff. Burns and Mitchell (1946, chap. 11) reported largely negative or inconclusive results from tests of the former hypothesis for the United States. More generally, they found that long-run cyclical changes rarely had a dominant influence on the short-run cyclical behavior of a sample of United States series on general business activity, prices, production, investment in capital goods, and yields and the volume of trade in security markets.

Business cycles have certainly varied greatly in amplitude, diffusion, and duration, and important distinctions can be made between major and minor cycles—for example, with respect to the relative roles and behavior of monetary aggregates, fixed investment, and inventory investment. But these matters will not occupy us here. There is little evidence of periodicities in the occurrence of groups of major and minor cycles. However, we shall consider, in the light of currently available data, one old hypothesis related to the Kondratieff cycles, namely that business cycle expansions have tended to be longer (and larger?) and contractions shorter (and smaller?) during the upward phases of the long waves in prices than during the downward phases.

This paper, then, will focus in particular on the "secular" changes in cyclical behavior, a category that naturally seems to deserve most attention. However, the secular and the discontinuous changes are not necessarily clearly differentiated. Not all trends can be safely projected, and not all changes labeled secular may prove irreversible.

9.3 Durations of Cyclical Phases before and after World War II

Studies of business cycles in the pre–World War II era have not been able to document major changes of either secular or discontinuous type. Tests by Burns and Mitchell (1946, chap. 10) gave little or no support to the view that substantial long-term changes occurred in the durations and amplitudes of cyclical movements in the sample of long United States time series. Mills's (1926) hypothesis that the cycles tend to get shorter in stages of rapid growth also failed to be confirmed by these tests. Comparisons of cycles before and after 1914 (then often alleged to have marked a "break" in American business history) indicated more basic similarities than differences, although the fluctuations during the period between the two world wars were unusually large.

Such major changes of systematic nature as can be observed in aggregate measures and particular aspects of cyclical behavior refer principally to comparisons between the period after World War II and the earlier era. As shown in table 9.1, the eight contractions of 1945–82 were on the average much shorter, and the eight expansions much longer, than the corresponding phases in each of the three subsets with equal numbers of consecutive business cycles that together span the preceding century (lines 1–4, cols. 3 and 5). In 1846–1945, the mean duration of expansions was thirty months, that of contractions twenty months; in 1945–82, expansions averaged forty-five months and contractions eleven months.

The proportion of time that the economy spent declining dropped from 45% in 1846–1945 to 20% in 1945–82 (col. 9). These results are altered but little, to 46% and 25%, respectively, when five cycles are

Table 9.1 **Duration of Business Cycles in the United States by Selected Subperiods, 1846–1982**

Period (1)	Number of Business Cycles Covered (2)	Duration in Months[a]						Percentage of Time in Contraction[b]	
		Expansions		Contractions		Business Cycles			
		Mean (3)	SD (4)	Mean (5)	SD (6)	Mean (7)	SD (8)	All (9)	Peacetime[c] (10)
All Cycles									
1846–85	8	32	16	27	18	59	28	45	46
1885–1912	8	23	5	17	5	40	4	42	42
1912–45	8	33	24	17	12	51	20	34	47
1945–82	8	45	28	11	4	56	27	20	25
Excluding marginal recessions[c]									
1846–85	7	39	21	28	19	68	38	42	
1885–1912	6	36	21	18	5	53	21		33
				Summary					
1846–1945	24	30	17	20	13	50	21	41	
1846–1945[c]	21	36	21	21	14	57	27	37	
1846–1982	32	33	21	18	12	51	22	35	
Peacetime cycles[d]									
1846–1982	27	28	13	19	12	46	18		41
1846–1982[c]	24	33	18	19	13	52	25		37

Source: National Bureau of Economic Research. For individual cycle durations, annual estimates for earlier cycles (1790–1845), and specific references, see appendix A in this volume, tables A.2, A.3, and A.5.

[a]Based on the monthly NBER reference dates, except for the two earliest cycles dated in calendar years (troughs: 1846 and 1848; peaks: 1847 and 1853). Mean = mean duration; SD = standard deviation, in months. Col. (3) + col. (5) = col. (7), except for rounding.

[b]Months of business cycle contractions divided by total months covered, times 100.

[c]The following phases designated as contractions in the NBER chronology are treated as retardations rather than recessions and included, along with the preceding and following phases, in long expansions: 6/1869–12/1870; 3/1887–4/1888; 6/1899–12/1900. For detail, see Zarnowitz 1981, 494–505.

[d]Excludes five wartime cycles (trough–peak–trough dates) associated with the Civil War (6/1861–4/1865–12/1867); World War I (12/1914–8/1918–3/1919); World War II (6/1938–2/1945–10/1945); Korean War (10/1949–7/1953–5/1954); and Vietnam War (2/1961–12/1969–11/1970).

omitted that include the long wartime expansions and the relatively short postwar contractions (col. 10). The mean durations of the pre–1945 and post–1945 peacetime expansions are twenty-six and thirty-four months; contractions, twenty-one and eleven months.

A few of the mildest contractions in the NBER chronology of the nineteenth-century cycles may actually have been episodes of below-trend but still positive growth rates—pronounced retardations rather than absolute declines (Zarnowitz 1981). That is, the chronology may have (inadvertently) recognized some growth cycle slowdowns rather than recessions, which would tend to make expansions and contractions more nearly equal in length (see appendix A, sect. 8, to this volume). But allowing for this possibility would not significantly alter our conclusions. The proportions of time in contractions for peacetime cycles, recalculated on this assumption, would be 40% before 1945 and (an unchanged) 25% after 1945.

Contractions became more uniform in length after World War II (col. 6). Expansions become less uniform, but this is chiefly the effect of the wars, all but one of which occurred in the last two of our four periods (col. 4).

With regard to the total cycle durations, neither the means nor the standard deviations indicate any significant trends. Expansions lengthened and contractions shortened drastically, but cycle lengths remained about the same (cols. 7 and 8).

One of the implications of these findings is that contractions have become more predictable in length than they were in earlier times. For example, if we take two standard deviations as the likely range, this was eight months in the period 1945–82. Added to the mean of eleven months, this makes nineteen months the practical upper limit. In fact, no contraction in this period lasted more than seventeen months. Before 1945, the estimated ranges was twenty-six months, yielding an upper limit of forty-six months, which was not exceeded in the Great Depression (forty-three months).

9.4 Business Cycle Phases and Long-Term Trends in Prices

Between 1789 and 1932, wholesale and consumer prices in the United States followed alternating upward and downward trends (table 9.2). The long upswings lasted between 21 and 25 years; the long downswings varied more, from 12 to 32 years. These movements largely canceled each other over the entire stretch of more than 140 years, so that the level of prices at the bottom of the Great Depression was not much higher than when George Washington took office. The half-century since 1932, however, witnessed the longest, largest, and most continuous inflation on record. Except in the recessions of 1937–38 and 1948–

49, no significant price-level declines occurred in this period. Wholesale prices increased by a factor of almost nine, consumer prices by a factor of seven (cf. cols. 4–7 of the table).

Apart from the secular trends, the comprehensive price indexes show generally procyclical short-term movements. Before 1932, they rose during most business expansions and fell during most business contractions, conforming in this sense about three-quarters of the time.[4] In periods of upward trend, the cyclical rises in prices were on the average large and the declines small; in periods of downward trend, the opposite situation prevailed, that is, the rises tended to be small and the declines large (cols. 8 and 9). But after 1949 prices kept increasing even when the economy declined, although virtually every major slowdown and recession was associated with a temporary reduction in the inflation rate.

To be sure, the long-period averages in table 9.2 conceal a very large amount of variation over time, both between the wartime and peacetime episodes and among the latter. Nonetheless, it is important to note that over the past fifty years as a whole inflation became a grave problem not because it was unusually high during expansions but because, unlike earlier times, it was only slowed, not reversed, during contractions. The booms have not grown more inflationary, but the deflationary slumps have disappeared. Indeed, the average percentage increase per year in wholesale prices is 1.8 for the ten recessions of 1937–82, substantially higher than the 1.2 figure for the entire 193-year period covered in table 9.2.

In his introductory chapter to Thorp's *Business Annals* (1926, 65–66), Mitchell observed that the ratios of "prosperous" to "depressed" years have been systematically higher in periods of rising trends in wholesale prices than in periods of declining trends. For the United States and England, the former ratios averaged 2.7 and 2.3, the latter 0.8 and 0.6, respectively. Twenty years later, armed with better and longer chronologies, Burns and Mitchell confirmed the hypothesis that long swings in prices were associated with the relative length of business cycle expansions and contractions (1946, 437–38, 538). The results based on their data for Great Britain, France, and Germany are presented in table 9.3, sections B, C, and D. Section A shows more detailed findings for the United States, based on longer and updated records (see Moore 1983a, chap. 15).

4. The monthly index of wholesale prices (Warren/Pearson, 1854–91, and Bureau of Labor Statistics, 1891–1933) rose in thirteen out of twenty expansions and fell in seventeen out of twenty contractions. Snyder's monthly index of the general price level, covering a broad assortment of prices (1861–1933), rose in fifteen out of eighteen expansions and fell in thirteen out of nineteen contractions. See Burns and Mitchell 1946, 98–101. For confirming detailed evidence on the behavior of wholesale prices since 1891, see Cagan 1975, 56–57.

Table 9.2 **Long-Term Trends and Average Cyclical Changes in Prices, United States, 1789–1982**

Trend in Wholesale Prices[a]			First and Last Year Standings		First to Last Year Change (%/year)		Average % Change in WPI (annual rate)[f]	
Direction (1)	Dates (2)	Number of Years (3)	WPI[b] (1967 = 100) (4)	CPI[c] (1967 = 100) (5)	WPI[d] (6)	CPI[e] (7)	Business Cycle Expansions (8)	Business Cycle Contractions (9)
Rising	1789–1814	25	30–64	30–63	3.1	3.0		
Falling	1814–43	29	64–26	63–28	−3.1	−2.8		
Rising	1843–64	21	26–68	28–47	4.7	2.5		
Falling	1864–96	32	68–24	47–25	−3.2	−2.0	0.4	−2.3
Rising	1896–1920	24	24–80	25–60	5.1	3.7	9.7	−1.6
Falling	1920–32	12	80–34	60–41	−6.9	−3.1	2.1	−13.7
Rising	1932–82	50	34–299	41–289	4.4	4.0	6.5	1.8
Total or average		193			1.2	1.2		

[a]The periods of rising and falling trends in wholesale prices agree with those designated by Burns and Mitchell 1946, 432, for 1789–1932.

[b]WPI = wholesale price index. U.S. Bureau of Labor Statistics index, 1896–1982; Warren/Pearson index, 1789–1894 (spliced to the BLS index at 1890).

[c]CPI = consumer price index. Estimated by the BLS by splicing several indexes together, namely: 1800–1851, index of prices paid by Vermont farmers for family living; 1851–90, consumer price index by Ethel D. Hoover; 1890–1912, cost of living index by Albert Rees; 1913–present, BLS. See *Handbook of Labor Statistics* (1971), 253). We estimate the 1789 figure by splicing the Warren/Pearson wholesale price index to the Vermont price index at 1814 (see *Historical Statistics of the United Sates*, U.S. Department of Commerce 1975, 201–2). The figures for these early years are rough approximations only.

[d]Based on entries in col. 4.

[e]Based on entries in col. 5.

[f]Rates of change are computed between three-month average levels centered on business cycle peaks and troughs as dated in the NBER monthly reference chronology.

Table 9.3 **Trends in Wholesale Prices and the Relative Duration of Business Cycle Expansions and Contractions, 1790–1982**

Trend in Prices (direction and dates)[a]	Business Cycle Expansions (E)[b]			Business Cycle Contractions (C)[b]			Ratios (E)/C	
		Duration in Months			Duration in Months			
	Number (1)	Average (2)	Total (3)	Number (4)	Average (5)	Total (6)	Average (2)/(5) (7)	Total (3)/(6) (8)
				A. United States				
Rising								
1789–1814	5	42	210	4	22	90	1.9	2.3
1843–64[c]	6 (5)	32 (30)	194 (148)	5	15	74	2.1 (2.0)	2.6 (2.0)
1896–1920[c]	7 (6)	23 (20)	163 (119)	6	18	108	1.3 (1.1)	1.5 (1.1)
1932–82[c]	10 (7)	49 (37)	487 (256)	10	11	109	4.5 (3.4)	4.5 (2.3)
Total or average	28 (23)	36 (32)	1,054 (733)	25	16	381	2.2 (2.0)	2.8 (1.9)
Falling								
1814–43	6	27	162	7	27	186	1.0	0.9
1864–96	7	25	175	8	26	211	1.0	0.8
1920–32	3	23	70	4	22	88	1.0	0.8
Total or average	16	25	407	19	25	485	1.0	0.8

				B. Great Britain[d]				
Rising								
1854–73, 1896–1920	10	38	381	8	17	133	2.2	2.9
Falling								
1873–96, 1920–33	5	30	152	7	38	266	0.8	0.6
				C. France[d]				
Rising								
1865–73, 1896–1926	11	31	337	9	15	137	2.1	2.5
Falling								
1873–96, 1926–35	4	30	121	6	34	204	0.9	0.6
				D. Germany[d]				
Rising								
1895–1923	6	40	240	6	18	105	2.2	2.3
Falling								
1923–33	4	32	129	4	42	168	0.8	0.8

[a]Through 1932 based on Burns and Mitchell 1946, 432. Also see table 9.2 for the United States. For 1932–82, see Moore 1983 a, 240.

[b]The NBER monthly business cycle chronologies are used. From 1789 to 1843 the United States dates are based on Thorp 1926, 94, and Mitchell 1927, 444–45, with years of "revival" and "prosperity" classified as expansion, and "recession" and "depression" classified as contraction.

[c]Entries in parentheses exclude wartime expansions (Civil War, World Wars I and II, Korean War, and Vietnam War).

[d]Based on Burns and Mitchell 1946, 437.

In each period of rising trend in prices, expansions lasted on the average much longer than contractions, in most instances more than twice as long. In each period of falling trend in prices, expansions tended to be either about as long as contractions (this is so for the United States) or considerably shorter (for the other countries). These contrasts are both regular and large (table 9.3, cols. 2, 5, and 7).

In addition, the relative frequency of expansions has been greater in the long upswings of prices, that of contractions in the long downswings (cf. cols. 1 and 4). Hence the total phase durations and their ratios add further emphasis to the showing of the corresponding statistics for the average phase durations (cols. 3, 6, and 8).

Prices have risen strongly in wartime expansions, but the relationship documented above does not rely mainly on this fact. When the five major wars of United States history are excluded (as in lines 2–5 of the table), the contrast between the periods of upward and downward price trends is not much diminished.

How should the association between the price trends and the relative duration of business cycle phases be interpreted? With prices in the short run being less than fully flexible, fluctuations in aggregate demand, whatever their causes, will be met in part by output movements, in part by price adjustments. As a result, cyclical changes in output and prices will tend to be positively correlated. Beyond that, actual and expected price-level rises may temporarily stimulate economic activity if they are perceived as favorable movements in relative prices and profits, and analogously price-level declines may be discouraging if taken as signals of adverse changes in the same variables. But these can only be very short-lived effects insofar as they depend on misperceptions of general for relative price movements owing to information lags. Propagation mechanisms that may amplify and prolong the consequences of such errors have been suggested, however, and views on the matter are still divided, as reflected in the recent debates on the equilibrium models of business cycles (Zarnowitz 1984). But few have argued that *long-run trends* in the level of prices have clear and lasting effects on real activity or that secular inflation is necessary for economic growth. There is essential agreement that the long price movements reflect mainly trends in money and credit creation that have no definite, permanent effects on the evolution of the economy in real terms.

Indeed, there appears to be no association between the *rate* of inflation during each business cycle and the relative length of expansion versus contraction. The expansion/contraction ratios for the two cycles between 1953 and 1960 (3.9 and 3.0) were not unlike the ratio for the 1973–80 cycle (3.6), but inflation averaged a little over 1% per year in 1953–60 and 9% per year in 1973–80. GNP in constant dollars advanced at similar average annual rates in the two periods (2.6% and 2.8%), and

unemployment increased from 4.9% in 1953–60 to 6.6% in 1973–80. As is well known, growth in the supply of money and credit accelerated sharply in the intervening twenty years; this resulted in more inflation and higher interest rates without stimulating the economy and reducing unemployment.

Prices tend to move up briskly when expansions gather steam, particularly in the boom phases at high levels of capital and labor utilization; they often used to decline and now typically rise more slowly in business contractions, particularly long slumps. This reflects both the cyclical fluctuations in aggregate demand and the typical reactions of businessmen. In a recession costs are cut, profit margins are pared, and discounts are given to move heavy inventories or prevent their costly accumulation. Failures increase, and going out of business sales at low prices multiply as well. Wages rise more slowly and are reduced here and there under the pressure of increased layoffs and unemployment. Costly overtime work is cut back or eliminated. Consumers become more economical and cautious, especially about borrowing and spending on durable goods. All of this works in the direction of lower prices or at least lower inflation rates. Thus it is not surprising that the trends are toward less inflation (or more deflation) in periods during which business contractions are relatively long and frequent and that the converse applies to periods dominated by expansions (see also Moore 1983a, chaps. 14 and 15).

Thus it is not the long inflations that should be credited with shortening recessions and lengthening expansions; rather, the opposite chain of influence deserves to be considered, in combination with the multiplicity of factors that would historically account for the shifts in the relative duration of business cycle phases. These include money and credit trends and financial innovations; changes in the structure of production, employment, and markets; changes in economic policies, institutions, and regulations; and major external shocks such as wars, financial crises, large failures, explosions and collapses of basic commodity prices, and gold discoveries. To apportion these influences to the observed shifts in the nature of business cycles would surely be an important but massive research undertaking that cannot be attempted here.

9.5 The Reduced Severity of Recessions since World War II

The limitations of the available time series data make it difficult to measure the amplitude of business cycles, particularly over long historical periods for which there are few monthly or quarterly statistics as comprehensive as such current indicators as real GNP, personal income, manufacturing and trade sales, and employment. To compare the size of recent expansions and contractions with those of the more

distant past, about the best we can do is to use indexes of business activity or production and nonagricultural employment (table 9.4).

These comparisons are inevitably crude because of compositional shifts in the available measures of business activity and employment.[5] In particular, factory or manufacturing employment (used before 1929) is typically more variable over the business cycle than total nonagricultural employment, which includes a large and rising share of the relatively stable services (see next section). But such differences in the data probably account only in part for the large contrasts observed between the average percentage amplitudes in table 9.4. These measures are much smaller for 1945–82 than for 1912–45 or 1914–45. The cyclical movements in business activity and employment were also on the average smaller in 1885–1912 or 1891–1914 than in the period during and between the two world wars, but by much narrower margins.

The ranking of the three subperiods is the same for expansions and contractions, but the relative differences between the average amplitudes are greater for contractions. The exclusion of the wartime cycles does not alter the qualitative findings just summarized (its main consequence is to reduce the average expansion amplitudes for the periods concerned). When the amplitudes of expansions and contractions are added without regard to sign, the results once more confirm the shifts toward smaller movements of production and employment after 1945, for both all cycles and peacetime cycles (cols. 1, 3, and 5).

The cyclical movements in the series covered were in general less variable in 1945–82 than in the earlier periods, as indicated by the standard deviations of the individual amplitude measures (cols. 2, 4, and 6). This applies strongly and without exception to the comparisons with 1912–45 or 1914–45.

What these measures suggest, then, is that business contractions have been on the average milder in the post–World War II era and also that their depth varied less across the recent cycles than it did in

5. The Axe/Houghton index (used for the 1885–91 cycles) is based on pig iron production, imports, bank clearings outside New York City, and traffic revenue per mile for selected railroads. The Babson index (for 1891–1920) is a base-year weighted aggregate of seasonally adjusted physical volume or constant-dollar series, with coverage expanding from eleven to thirty-three components. It includes manufactures, minerals, agricultural marketings, construction, railway freight ton-miles, electric power and foreign-trade volume, weighted by value added. The Federal Reserve Board index of industrial production (1920–82) initially included about fifty series. Its coverage increased over time to more than two hundred series representing output in manufacturing, mining, and public utilities. The index of factory employment for 1891–1911 is based on data for Massachusetts, New Jersey, and New York (Jerome 1926). The Bureau of Labor Statistics (BLS) index of factory employment (1913–82) is based on a national sample of cooperating national establishments. The BLS series on nonagricultural employment (used after 1933) is based on monthly reports from a very large number of establishments (some 160,000). (For more detail, see Moore 1961a, vol. 2; U.S. Department of Commerce 1977.)

earlier times. These findings parallel those on the shorter and more uniform durations of the recent contractions as reported in section 9.3 above.

The moderation of business cycles, manifest in the relatively brief, mild, and infrequent recessions of the 1950s and 1960s, was clearly an international phenomenon. Extraordinarily long and vigorous expansions occurred in Japan, West Germany, France, and Italy. One presumed reason lies in unique initial conditions. The end of the war found Europe and the Far East economically in stages of unprecedented exhaustion. Yet the war left behind not only the ruins of much of the physical capital of industry and commerce but also huge backlogs of unutilized but skilled human resources and unsatisfied demand. What followed was an era of Great Reconstruction: first a restoration of sound currencies and free markets, then rapid growth of employment, output, investment, and trade. Cyclical setbacks assumed for some time the form of retardations of growth rather than absolute declines. The United States economy, starting after the war from so much higher levels, intact and very strong, grew more slowly than that of Japan and Western Europe (other than the United Kingdom).[6] Here mild contractions continued to recur, although the expansion in the 1960s persisted beyond all previous experience and expectations.

This record suggests the hypothesis that higher rates of real growth, which prevailed in many countries in the first quarter-century after 1945 under conditions favoring capital formation and international trade and development, tend to be associated with less cyclical instability. We shall examine the United States evidence on this point in section 9.9 below.

Another type of partial explanation relies on structural changes that make the contemporary highly developed economies less recession-prone. Trends in the industrial composition of employment illustrate such changes (sect. 9.6). Shifts in the structure of personal income provide another example (sect. 9.8). Here postdepression reforms concerning taxes and transfer payments that act as "built-in stabilizers" have played an important role.[7]

6. For example, the average annual growth rates of real GNP in 1950–69 were 3.9% for the United States, 6.8% for West Germany, and 5.3% for France. Japan's output grew 9.7% per year in 1952–69, Italy's 5.6% per year in 1951–69. The corresponding average for the United Kingdom, 1950–69, was 2.7%. See U.S. Department of Commerce 1973, 99.

7. Similarly, deposit insurance is believed to have strengthened public confidence in the financial system and prevented the runs on banks that were a major feature of the crises and some depressions in the pre–World War II era. On the other hand, there are some new sources of instability in this area, such as recurrent disintermediation, credit controls, and "credit crunches"; financial innovations and fluctuations in the demand for money and credit; and the uncertainties of current moves to relax banking and related regulations.

Table 9.4 **Measures of Amplitude of Cyclical Movements in the United States, by Selected Subperiods, 1885–1982**

Period	Number of Business Cycles (specific cycles) Covered (1)	Percentage Changes Associated with: Expansions[a] Mean (2)	Expansions[a] SD (3)	Contractions[b] Mean (4)	Contractions[b] SD (5)	Business Cycles[c] Mean (6)	Business Cycles[c] SD (7)
		Industrial Activity or Production[d]					
All cycles							
1885–1912	8 (8)	+38.6	8.5	−15.0	6.6	53.6	8.7
1912–45	8 (8)	+68.2	61.0	−28.6	14.2	96.8	65.8
1945–82	8 (8)	+35.4	21.1	−10.6	2.9	45.9	19.2
1885–1945	16 (16)	+53.4	44.8	−21.8	12.8	75.2	50.5
1885–1982	24 (24)	+47.4	39.0	−18.1	11.8	65.5	44.5
Peacetime cycles[e]							
1912–45	6 (6)	+49.5	41.0	−27.0	16.1	76.5	44.2
1945–82	6 (6)	+25.7	9.3	−11.4	2.8	37.0	8.4
1885–1945	14 (14)	+43.2	26.8	−20.2	12.7	63.4	30.5
1885–1982	20 (20)	+38.0	24.1	−17.5	11.4	55.5	28.4

		Factory or Nonfarm Employment[f]					
All cycles							
1891–1914	7 (6)	+22.7	12.0	−10.5	8.4	33.2	11.7
1914–45	7 (7)	+27.5	15.4	−16.5	10.6	43.8	13.0
1945–82	8 (8)	+14.8	9.7	− 3.0	1.3	17.8	9.3
1891–1945	14 (13)	+25.3	13.6	−13.6	9.7	38.9	13.1
1891–1982	22 (21)	+21.3	13.1	− 9.6	9.2	30.8	15.6
Peacetime cycles[e]							
1914–45	5 (5)	+21.9	13.8	−18.5	12.1	40.4	13.4
1945–82	6 (6)	+11.2	6.5	− 3.2	1.4	14.4	6.6
1891–1945	12 (11)	+22.3	12.2	−14.1	10.6	36.5	12.4
1891–1982	18 (17)	+18.4	11.7	−10.3	10.0	28.7	15.1

Source: NBER business cycle files.

[a]Means and standard deviations (SD) of percentage changes measured from the trough month in the series to the peak month.

[b]Means and SD of percentage changes measured from the peak month in the series to the trough month.

[c]Percentage change in each expansion is added to that in the following contraction without regard to signs; the means and standard deviations shown are based on the resulting measures of absolute amplitudes of trough-to-trough cycles. Entries in cols. 2 and 4 add up to those in col. 6 (disregarding signs), except for rounding.

[d]1885–91: Axe/Houghton index of trade and industrial activity; 1891–1920: Babson index of physical volume of business activity; 1920–82: FRB index of industrial production.

[e]Excludes the cycles associated with the Civil War, World Wars I and II, Korean War, and Vietnam War (see table 9.1, note c for details).

[f]1891–1919: Factory employment index, Jerome; 1919–33: Factory employment index, BLS; 1933–82: Employment in nonagricultural establishments, BLS.

There are still other general hypotheses that are by no means incompatible with those noted above. Probably the one most discussed is that discretionary demand management has become more sophisticated and effective in reducing cyclical instability. This is obviously a critical issue but also one very difficult to test. Most observers would likely agree that some successes were scored by United States monetary and fiscal policies in the 1950s and 1960s but that the record was mixed and marked by increasing errors on the inflationary side. The topic will not be pursued here.

9.6 Structural Shifts in Employment and Their Cyclical Effects

The share of United States employment accounted for by agriculture dropped from 48% in 1869 to 21% in 1929 and 4% in 1970. Business cycles have contributed to major swings in food prices, but they have weak effects on the number of persons engaged in, and total output of, farming. Business cycles are to a large extent a product of industrialization. Despite the great importance of the strong downward trend in agricultural employment, we shall concentrate on shifts in the industrial composition of *nonagricultural* employment, for two reasons. (1) In recent times, the changing nature of business cycles has been strongly influenced by these shifts, and much less so by the developments in agriculture, partly because the percentage employed in farming, though still declining, has already reached very low levels. (2) Over the longer run, the huge shift away from agriculture would overshadow the trends we wish to examine.

Table 9.5 shows that in total nonagricultural employment, the combined share accounted for by manufacturing, mining, and construction and by transportation, communications, and public utilities was stable in 1869–99 at about 56% but declined steadily to 48% by 1929. In the five cycles between the peaks of 1929 and 1957, that share fluctuated in the narrow range of 43% to 46%, but in the next five cycles, 1957–81, it fell steadily from 42% to 33%. The gainers included trade, insurance, real estate, personal and business services, and government—all service industries in the broad sense. This sector as a whole employed 44% of all persons engaged in nonagricultural production in 1869, 51% in 1929, and 67% in 1979–81 (cf. cols. 9 and 10 in table 9.5).

In the present context, the importance of this strong trend in the composition of employment rests on the fact that the rising industries have been much less recession-prone than the declining industries. The net result was a substantial reduction in the sensitivity of total employment to cyclical fluctuations in aggregate demand.

Table 9.5 **Trends in Industrial Composition of Nonagricultural Employment, Selected Peak Years, 1869–1929, and Business Cycle Averages, 1929–81 (percentage distribution)**

Year or Period[a]	Most Cyclical Sectors				Least Cyclical Sectors				Totals	
	Mining (1)	Contract Construction (2)	Manufacturing (3)	Transportation, Communication, Public Utilities (4)	Wholesale and Retail Trade (5)	Finance, Insurance, Real Estate (6)	Other Service Industries (7)	Government (Federal state, local) (8)	Most Cyclical Sectors[b] (9)	Least Cyclical Sectors[c] (10)
1869	2.5	9.5	34.0	9.9	15.1	0.8	21.5	6.8	55.9	44.2
1899	4.0	7.8	31.7	12.2	17.1	1.9	18.9	6.5	55.7	44.4
1929	2.8	6.2	28.5	11.0	21.1	4.2	17.5	8.6	48.5	51.4
1929–37	2.5	5.2	26.1	9.5	21.5	4.5	17.7	12.8	43.3	56.5
1937–44	2.1	4.7	28.7	7.4	19.2	3.5	14.6	19.8	42.9	57.1
1944–48	1.7	4.5	29.4	7.7	18.9	3.3	13.4	21.1	43.3	56.7
1948–53	1.8	6.3	29.9	7.7	20.2	3.8	14.7	15.5	45.7	63.3
1953–57	1.4	6.1	29.6	7.1	19.7	4.2	14.8	16.8	44.2	55.5
1957–60	1.3	6.0	28.2	6.8	20.1	4.4	16.2	16.9	42.3	57.6
1960–69	1.0	5.7	27.4	6.1	19.5	4.6	17.4	18.3	40.2	59.8
1969–73	0.8	5.0	25.7	6.0	20.6	5.0	15.8	21.0	37.5	62.4
1973–79	1.0	4.9	24.5	5.9	18.9	5.4	18.3	21.2	36.3	63.8
1979–81	1.1	4.7	22.1	5.6	22.0	5.6	19.3	19.7	33.4	66.6

Sources and notes: 1869–1929: Kendrick 1961, table A-VII, p. 308. Persons engaged are full-time-equivalent employees and proprietors and unpaid family workers. Coverage: national economy, excluding farm and agricultural services, forestry, and fisheries; government includes armed forces. 1939–69: U.S. Department of Commerce, Bureau of Economic Analysis, 1966 and 1973, part 3, table 4, p. 76. 1969–81: 1978 supplement to, and more recent issues of, *Survey of Current Business* (Department of Commerce). The employment estimates are based on establishment reports for the surveys of the U.S. Department of Labor, Bureau of Labor Statistics.

[a]The business cycle averages are from peak to peak, with peak years given half weight.

[b]Sum of corresponding entries in cols. 1–4.

[c]Sum of corresponding entries in cols. 5–8.

Table 9.6 provides the evidence. The average drop in employment during the recessions of 1948–82 varied from 10% per year for durable manufactures to 4–5% for the other sensitive industries: nondurable manufactures, mining, construction, and transportation, and so on. In trade, the declines averaged less than 1%, and in services, finance, and government, employment actually increased by about 2%, so these industries have been most resistant to cyclical declines (col. 3).

When the first four post–World War II contractions (1948–60) are separated from the last four (1970–82), some shifts in detail are observed, but the same division holds between the relatively recession-prone and recession-proof industries (cols. 1 and 2). Indeed, employment in most of the latter decreased much less or increased much more during the recessions of 1970–82 than during those of 1948–60.

If the 1959 distribution of employment among the nine major industries had prevailed in the four recessions of 1948–60, the average reduction in nonagricultural employment (other things equal) would have been 2.5%. For 1970–82 the corresponding estimate is 2%; for all eight contractions 1948–82 it is 2.3%. With the 1969 distribution, the reductions would have been 2.3%, 1.8%, and 2.0% for 1948–60, 1970–82, and 1948–82, respectively. With the 1982 distributions, the estimates are 1.7%, 1.0%, and 1.3%.

Between 1929 and 1959 shifts of this type were probably much less important, as table 9.5 suggests. Now we see that they had significant effects between 1959 and 1969 and much stronger effects between 1969 and 1982. Will they endure as a source of employment stabilization in the future? Ten years ago the United States Bureau of Labor Statistics (BLS) made projections to 1985 that assumed that the share of government and private service industries would continue to increase. Their most recent projections to 1995, however, imply a cessation (but not a reversal) of the overall shift toward the more recession-proof industries (table 9.6, col. 7). The rise in personal and business services is expected to be offset by a relative decline in government employment.

The expansion of the share of government in the economy persisted so long that even many who deplore this development regard it as nearly inevitable ("Wagner's law"). Yet it is not a natural, irreversible tendency, and forces opposed to it may be getting stronger.

The demand for services in general is often hypothesized to be more income elastic than the demand for goods, but Fuchs (1968, 3–5) noted that the proportion of services in total output was the same in 1965 as in 1929. He suggested that the shift of employment from industry to service is explained largely by the higher labor requirements in the latter sector. Output per worker grew much more

slowly in the production of services than in the production of goods.[8] But real output of services, and therefore productivity, is difficult to measure and often poorly estimated. The notion of a continuing shift into less productive industries and occupations seems worrisome and hard to reconcile with competitive markets. In the current controversy on new industrial policies, proponents urge a government-supported "reindustrialization" drive that, they claim, would make the United States economy more productive and more competitive internationally. If this reverses the trend described above, however, the consequences for cyclical stability may offset some of the benefits.

9.7 Trends and Cyclical Changes in Unemployment and Labor Force Participation

Although the risk of losing a job has been reduced by the shift in the industrial composition of employment, the unemployment rate has fluctuated around a rising trend since the late 1960s. In this period shifts of product demand and derived labor demand between specific markets, industries, and occupations were accelerated by several developments, notably the intensification, fading, and end of the Vietnam War; the oil price increases; the swift spread of new products and technologies (computerization); and the decline of some old industries such as steel, prompted in part by increasing competition from imports. The unusually large intersectoral shifts contributed to the increases in unemployment (Lilien 1982). In addition, other noncyclical factors probably operated in the same direction. The composition of the labor force shifted toward greater participation by women and teenagers, groups with relatively high rates of labor market turnover and unemployment. Higher unemployment benefits and wider coverage have probably added to the average time spent in job search and hence to the average duration and rate of unemployment. At the same time, the percentage of the working-age population employed has risen, reaching a peacetime record high in 1979.

In the recession of 1981–82, the *highest* attained rate of unemployment was 10.8%, exceeded only by the maximum rate reached during the major depressions of 1920–21 (not much higher) and 1929–33 and 1937–38 (which were extraordinarily high). On the other hand, the *increase* in the unemployment rate in 1981–82 was not particularly

8. Thus the average annual rates of change in output per worker were 2.2% in industry and 1.1% in service (3.4% in agriculture). The classification here is much the same as in table 9.6, but industry includes government enterprise (service always includes general government). The corresponding statistics for 1959–82 are industry 1.9% and service 0.9% (based on BLS employment and Bureau of Economic Analysis [BEA] output data).

Table 9.6 **Estimated Effects of Shifts in Industrial Composition on Cyclical Stability of Nonagricultural Employment, 1948–95**

	Average Percentage Change in Number Employed[a]			Percentage of Nonagricultural Employment[b] Accounted for			
	Four Recessions, 1948–60 (1)	Four Recessions, 1970–82 (2)	Eight Recessions, 1948–82 (3)	1959 (4)	1969 (5)	1982 (6)	1995[c] (7)
Industries declining most in recessions							
Durables manufactures	−11.0	−10.0	−10.5	16.0	15.8	11.6	11.8
Contract construction	−2.4	−7.2	−5.0	6.4	5.7	5.6	6.4
Mining	−11.0	−1.4	−4.8	1.0	0.6	0.7	0.7
Nondurables manufactures	−3.3	−5.2	−4.2	12.5	11.0	8.1	7.3
Transportation, communication, public utilities	−5.4	−1.8	−3.6	7.3	6.1	5.6	5.3
All of the above	−6.8	−6.8	−6.8	43.2	39.2	31.6	31.5
Industries declining least in recessions							
Wholesale and retail trade	−1.2	−0.1	−0.7	22.2	21.8	23.0	23.1
Personal and business services	1.2	3.0	2.1	16.2	18.0	23.1	25.3

Finance, insurance, real estate	2.1	1.7	1.9	4.9	5.1	6.1	6.2
Government	1.7	2.0	1.8	13.5	15.9	16.1	13.9
All of the above	0.4	1.5	1.0	56.8	60.8	68.3	68.5
Total nonfarm employment							
Actual	−3.2	−1.6	−2.4	100.0	100.0	100.0	100.0
Estimated, using the industry composition of							
1959 (col. 4)	−2.5	−2.0	−2.3				
1969 (col. 5)	−2.3	−1.8	−2.0				
1982 (col. 6)	−1.7	−1.0	−1.3				
1995 (col. 7)	−1.7	−1.0	−1.4				

[a]The percentage changes in employment during recessions are computed from three-month standings of seasonally adjusted data centered on business cycle peak and trough months. Simple averages are used; expressing the figures on a per year basis would not alter the results significantly. (The average durations of the recessions were: 1948–60, ten months; 1970–82, twelve months; 1948–82, eleven months.) The measures are based on data from the establishment survey (jobs) of the U.S. Department of Labor, Bureau of Labor Statistics.

[b]The data used to compute these distributions are based on the establishment survey but include also self-employed and unpaid family workers (but not paid household employees). The total number of jobs represented in the distributions are (in thousands): 1959, 59,640; 1969, 76,584; 1982, 97,865; and 1955 (projected) 123,667. See Personick 1983, table 2, p.26. The "moderate growth projection" for 1995 assumes average annual growth rates of employment of 1.8% from 1982 to 1990 and 1.5% from 1990 to 1995.

[c]Projected by the U.S Bureau of Labor Statistics.

large. Jobless rates in recent contractions were generally much higher than in previous contractions of comparable size, 1923–24 and 1926–27. This can be seen clearly in table 9.7, which compares the duration, depth, and diffusion of United States business cycle contractions since 1920, using measures of production, employment, and unemployment.

The measures are highly but far from perfectly correlated (see the matrix of the correlation coefficients in table 9.7). Of course, unemployment changes and levels are inversely associated with the declines in real GNP, industrial production, and nonfarm employment. The measures of depth or amplitude (cols. 2–6) are most closely related to each other, but the correlations involving duration and diffusion (cols. 1 and 7) are also significant.

Comparisons of these and other statistics suggest that four mild recessions occurred during the sixty-two years covered in the table, one in the 1920s (1926–27), and three since 1960 (1960–61, 1969–70, and 1980). There were six sharp recessions, all but one (1923–24) in the post–World War II period (1948–49, 1953–54, 1957–58, 1973–75, and 1981–82). The three major depressions go back to 1920–21 and the 1930s: the "Great Depression" of 1929–33 was in many respects unique and was by far the most severe according to all measures. The 1945 recession was also quite particular because of its timing (end of World War II) and nature (transition back to peacetime production). It was brief and mild in terms of unemployment, sharp in terms of the decline in industrial production.

The ranks in table 9.7, column 8, based on the averages of the ranks of the entries in each of the columns 1–7, agree with the classification above. The only ambiguity refers to the sui generis 1945 reconversion episode.

An important caveat should be entered at this point, namely, that there is no way to construct a really satisfactory single measure of the severity of recessions. Cyclical movements are complex and differentiated in terms of duration, diffusion, and depth. Some are relatively short but large and pervasive, such as the business contraction of 1937–38; others are of similar length but small and less widely spread, such as the recessions of 1960–61 and 1970. The use of average ranks is a crude approximation procedure, which is further aggravated by the gaps in the data. Nevertheless, the results appear to be sensible in that they agree with much broader evidence from historical and statistical studies. We have experimented with other data without finding any good reasons to alter our conclusions.[9]

9. In particular, attempts to close the gaps in ranks run into problems of comparability. The declines in factory employment (BLS) rank the contractions of 1920–21, 1923–24, and 1926–27 in agreement with the labels MD, SR, and MR, respectively (they are −31.1%, −13.7%, and −5.3%). But factory employment has larger amplitudes than

Coming back to the unemployment rate, it is the change in, rather than the level of, this variable that deserves most attention as an indicator of relative cyclical performance. The level attained during a recession is influenced in part by the level reached during the preceding expansion—that is, it combines a measure of the weakness of the preceding expansion with the severity of the recession. Moreover, the level is influenced by trends in the age/sex composition of the labor force, as illustrated by the results from a Bureau of Labor Statistics study (table 9.8).[10]

The rise in unemployment rate between 1959 and 1977 would have been much smaller if the age/sex composition of the labor force had remained as it was in 1957 or in 1967. Over the short periods encompassed by recession, however, these demographic changes are much less consequential, hence the *change* in the rate during a recession is affected less by these shifts and more by factors related to the severity of the recession itself.

In addition, it is important to consider the sensitivity of the labor force itself to changing market conditions and the implications this has for the interpretation of the unemployment measures. In a recession, some additional workers enter the labor force to bolster declining family incomes. At the same time some unemployed workers, frustrated in their job search, withdraw from the labor market. Indeed, when the prospects for finding work at good wages appear to be poor, they may not even compensate for the expected search costs, so some would-be new entrants or reentrants will not even commence looking for jobs. Here as elsewhere, then, income and substitution effects can coexist in practice as well as in theory, and the empirical question is which one prevails. The evidence is that the civilian labor force, apart from its dominant upward trend, tends to respond positively to business cycles. That is, the "discouraged workers" effect generally outweighs the "added workers" effect.

The elasticity of the response of the labor force to cyclical changes in the demand for workers is in the aggregate not high, perhaps about 0.2 on the average (Mincer 1966, 88). Much more sensitive are those groups that are typified by relatively weak (but growing) attachment to the labor force, namely women and youth (especially working wives and students). On the other hand, the participation rate of adult men declined fairly steadily from 89% in 1948 to 78% in 1983. Among older

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total nonagricultural employment. For example, the declines in 1929–33 were −43.0% and −31.6% respectively; in 1937–38, −21.2% and −10.8%. Real GNP also declined strongly between the years 1944 and 1946 (by some 16%), but changes in the composition of output in this period of transition from wartime to peacetime production make it difficult to interpret this development.

10. See Flaim 1979, 16–17.

Table 9.7 **Selected Measures of Duration, Depth, and Diffusion of Business Cycle Contractions, 1920–82**

Monthly Business Cycle Dates: Peak–Trough[a]	Duration[b] (months) (1)	Percentage Decline[c]			Unemployment Rate		Employment Diffusion (% of industries declining)[f] (7)	Severity Ranking[g] (8)
		Real GNP (2)	Industrial Production (3)	Nonfarm Employment (4)	Increase[d] (5)	Maximum[e] (6)		
1/1920–7/1921	18	−8.7	−32.4	−10.5	+10.3	11.9	97	13
5/1923–7/1924	14	−4.1	−17.9	−2.2	+2.6	5.5	94	10
10/1926–11/1927	13	−2.0	−7.0	−0.4	+2.4	4.4	71	3
8/1929–3/1933	43	−32.6	−53.4	−31.6	+21.7	24.9	100	14
5/1937–6/1938	13	−18.2	−32.4	−10.8	+9.0	20.0	97	12
2/1945–10/1945	8	n.a.	−38.3	−10.1	+3.4	4.3	n.a.	6
11/1948–10/1949	11	−1.5	−10.1	−5.2	+4.5	7.9	90	8
7/1953–5/1954	10	−3.2	−9.4	−3.5	+3.6	6.1	87	5
8/1957–4/1958	8	−3.3	−13.5	−4.3	+3.8	7.5	88	7
4/1960–2/1961	10	−1.2	−8.6	−2.2	+2.1	7.1	80	3
12/1969–11/1970	11	−1.0	−6.8	−1.5	+2.7	6.1	80	3
11/1973–3/1975	16	−4.9	−15.3	−2.9	+4.4	9.0	88	11
1/1980–7/1980	6	−2.5	−8.6	−1.4	+2.1	7.8	77	1
7/1981–11/1982	16	−3.0	−12.3	−3.1	+3.6	10.8	81	9
				Averages				
Three major depressions	25	−19.8	−39.4	−17.6	+13.7	18.9	98	12–14
Six severe recessions	12	−3.3	−13.1	−3.5	+3.8	7.8	88	5–11[h]
Four mild recessions	10	−1.7	−7.8	−1.7	+2.3	6.4	77	1–3
Fourteen contractions	14	−6.6	−19.0	−6.4	+5.4	9.5	87	1–14

	Correlations[i]						
Duration (1)	1.00						
Real GNP (2)	.87	1.00					
Industrial production (3)	.70	.95	1.00				
Nonfarm employment (4)	.86	.96	.91	1.00			
Unemployment increase (5)	.91	.95	.84	.96	1.00		
Unemployment maximum (6)	.78	.95	.72	.83	.90	1.00	
Employment diffusion (7)	.67	.68	.80	.69	.71	.67	1.00

[a]The monthly reference dates are determined by the National Bureau of Economic Research.

[b]Period from peak to trough according to the dates listed to the left.

[c]Percentage change from the peak month or quarter in the series to its trough month or quarter. Real (constant dollar) GNP is quarterly; the other series are monthly.

[d]From the lowest month to the highest, in percentage points.

[e]Highest figure reached during the upswing in unemployment.

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

[g]Based on averages of the ranks of entries in cols. 1–7. Rank 1 denotes the mildest, rank 14 the most severe contraction.

[h]Excluding rank 6, the 1945 contraction. See text.

[i]Correlations across cols. 1–7, as indicated in the column and row headings, with signs disregarded.

Table 9.8 The Shifting Demographic Structure of Unemployment, 1959–77

Year	Unemployment Rate (1)	Unemployment Rate as Estimated from Constant Age/Sex Distribution of Labor Force	
		1957 Weights (2)	1967 Weights (3)
1959	5.5	5.4	5.8
1969	3.5	3.1	3.4
1973	4.8	4.1	4.5
1977	7.0	6.0	6.7

men, age forty-five to sixty-four, earlier retirement became financially more attractive and increasingly frequent in the 1960s, and the downward movement in labor force participation accelerated in the 1970s (e.g., it was 92% in 1960, 90% in 1968, and 86% in 1984; see Bednarzik and Klein 1977, 8).

It has been suggested that, when combined, all these shifts in composition "imply an over-all trend toward an increasingly sensitive, variable, and flexible labor force" (Mincer 1967, 17). As the labor force responsiveness of a group rises, the cyclical amplitude and conformity of its measured unemployment rate decline. Entries and reentries become more frequent during expansions, when search costs are low and job conditions favorable. Entry rates decline and withdrawals rise when business is sluggish, reducing the labor force. Hence the change in unemployment may understate the true loss of potential employment and output. According to some indirect estimates, based on regressions of the labor force on cyclical indicators such as the employment/population ratios, the "hidden unemployment" was large indeed under relatively adverse labor market conditions (several million people in the early 1960s). But the estimates indicate a heavy concentration of this phenomenon in the categories of "secondary" workers who spend a relatively high proportion of time outside the labor force. Many of these people make their decisions to enter or withdraw in reaction to changes in labor demand as well as in supply and other relevant factors. Still, to some extent the labor force variation also reflects the tendency for discouraged workers to disappear in business expansions and reappear in contractions (Mincer 1966, 100–105; 1967, 16–20).[11]

The percentage of the working-age population employed is affected very differently by these factors than is the unemployment rate. In

11. Over longer periods, labor force growth may respond directly to favorable economic conditions. Using the data in the form of changes in percentage points per decade, Easterlin demonstrates that the contribution to labor force growth of changes in net migration and participation rate is inversely associated with the unemployment rate. For 1880–1965, the correlation is −.83 (Easterlin 1968, 151–53, 257).

1983, for example, almost exactly the same percentage of the working-age population (sixteen years and over) was employed as in 1973, namely 58.3%. (In these calculations, employment includes resident armed forces.) Other data, such as real personal income per capita or real compensation per hour, indicate that both years were about equally prosperous, but the unemployment rate in 1983 was nearly twice as high as in 1973, 9.5% compared with 4.8%. If calculated as a percentage of the working-age population instead of the labor force, unemployment was more than twice as high, 6.1% compared with 2.9%. What happened was that a massive shift occurred in the population's disposition to seek jobs. This pushed up the unemployment rate but did not signify any great change in the availability of jobs per capita, which is measured by the employment percentage. Since the two measures do not always give the same message regarding employment conditions, it is important to consider both in evaluating the severity of recessions.

9.8 Changing Sources of Personal Income and the Business Cycle

According to annual estimates by Creamer (1956, 126), personal income in constant dollars fell during five business contractions and rose during three in the period 1910–38. The average of these changes was −5.0%. Corresponding annual measures for the eight business contractions of 1948–82, based on the present Department of Commerce data, show a reverse picture: three declines and five rises, averaging +0.7%. Hence, real income has become far more stable during business cycles since World War II than before.

The composition of personal income by major types and sources shows that several long-term shifts have contributed to this increasing stability (tables 9.9 and 9.10). Wage and salary disbursements of government rose most of the time, accounting for 5% to 6% of total income in the business cycle peak years 1913 and 1929 but more than twice as much—11% to 14%—in the peak years of 1953–81. Transfer payments rose most strongly and persistently, from less than 1% of the total in 1929 and before to 19% in 1981. The relative decline in farmers' income, from 10% in 1913 to 1% in 1981, was slow in the first half of the period covered, rapid in the second half. Nonfarm proprietors' income also fell decisively in relative terms, from 15% to 4%. Wages and salaries in the private sector, by far the largest component of personal income, increased from 48% in 1913 to 58% in 1953, then fell back again to 48% in 1981.

Of the types of property income, the shares of two show downward trends: dividends (6%–7% in 1913–17, 2%–4% thereafter) and, particularly, rent (from 11% down to 1% between 1913 and 1981). The proportion of interest income fluctuated roughly between 3% and 6% in

Table 9.9 **Personal Income Distribution by Major Type, Selected Business Cycle Peak Years, 1913–81**

Type of Income	Percentage of Total Personal Income Accounted for							
	1913 (1)	1929 (2)	1937 (3)	1948 (4)	1953 (5)	1960 (6)	1969 (7)	1981 (8)
	Categories Declining Most in Recessions							
Wages and salaries, private	48.0	54.9	53.5	55.8	58.2	54.2	52.5	48.0
Farm proprietors' income	10.1	6.9	7.9	8.6	4.5	2.8	3.0	1.0
Nonfarm proprietors' income	15.2	10.1	9.3	10.8	9.6	8.6	5.5	4.0
All of the above	73.3	71.9	70.7	75.2	72.3	65.8	61.0	53.0
	Categories Declining Least in Recessions							
Wages and salaries, government	4.6	5.8	10.2	8.6	11.5	11.9	13.5	11.2
Other labor income and transfer payments	0.9	1.7	3.4	6.4	6.4	9.7	12.1	18.9
Dividends	6.0	7.0	6.6	3.5	3.3	3.1	2.9	2.5
Interest	4.0	6.4	5.0	2.5	2.7	6.1	7.8	13.1
Net rent	11.2	7.0	4.3	3.7	3.8	3.5	2.5	1.3
All of the above	26.7	27.9	29.5	24.7	27.7	34.3	38.8	47.0

Source: 1913–53: Creamer 1956, pp. xxix, 9, 116–23; 1960–81: computed by Cullity 1983, tables 1 and 2, from personal income statistics of the U.S. Department of Commerce, Bureau of Economic Analysis. See also table 9.10 below.

the peak years 1913–53 but grew from 6% in 1960 to 8% in 1969, then rose rapidly to 13% in 1981 during the period of high inflation.

Table 9.10 classifies these types of income into two groups: those that have been relatively recession-proof and those that have been recession-prone. In general, the categories whose shares increased have been relatively recession-proof (interest, rental income) or even countercyclical (transfers), whereas the categories whose shares drifted mostly downward have been generally recession-prone (proprietors' incomes and wages of private workers). Income of government employees and transfer payments did not decline even in the severe depression of 1937–38 and neither did rent, while the downturn in interest income was moderate. Although dividends fell sharply in 1937–38, they often resisted the milder recessions in the post–World War II period (but note their drop in 1981–82). Labor income in the private sector typically declined at least moderately in recessions, mainly owing to wages. It should be noted that the measures for 1937–38 and 1948–49 (cols. 1 and 2) are based on data in current dollars, the measures for the 1948–80 averages and 1981–82 (cols. 3 and 4) on data in constant dollars. It was, of course, necessary to adjust the recent figures for the effects of high inflation that masked the cyclicality of the nominal income series during most of the post–World War II era.

Suppose the cyclical changes in each of the sources of personal income were as observed and taken to be independent of the shifts in the distribution of the aggregate. How would the changes in the composition of income by sources influence the movements of total income under this assumption? The answer given by the estimates in the bottom section of table 9.10 is "strongly." For example, had the relative importance of the main categories of income been the same in 1981 as in 1948, the reweighted decline of real personal income during the 1981–82 recession would have been 4.3% instead of the actual 0.7% (col. 4). Using the 1948 weights would have doubled the relative amplitude of the average decline in real personal income in the seven recessions of 1948–80, from the observed 1.1% to the estimated 2.3% (col. 3). Conversely, the 1937–38 decline, which was actually 7.7%, would have been ceteris paribus only 4.1% under the distributional conditions of 1960 and 1.2% under those of 1981 (col. 1)!

To be sure, hypothetical calculations of this type must be interpreted with great caution. The critical assumption that the amplitude of income change for each category is independent of the compositional shifts could be undermined by various factors. For example, transfer incomes may support consumption, but their strong upward trend, with its implication of rising tax burdens, may at some point damage business confidence and investment. The rising share of interest income reflects increasing and high interest rates, which again can have strong adverse

Table 9.10 **Estimated Effects of Shifts in Types of Income on Cyclical Stability of Total Personal Income, 1937–82**

	Percentage Change during Business Cycle Contractions			
	Current Dollar Incomes		Constant Dollar Incomes	
	1937–38 (1)	1948–49 (2)	Average of Seven Recessions, 1948–80 (3)	1981–82 (4)
Categories declining most in recessions				
Wages and salaries, private	−10.2	−2.2	−3.4	−3.9
Farm proprietors' income	−21.4	−27.7	−13.0	−22.1
Nonfarm proprietors' income	−4.5	−2.3	−4.7	−1.8
All of the above	−10.7	−5.1	−4.1	−4.1
Categories declining least in recessions				
Wages and salaries, government	+11.0	+9.0	+2.1	+1.8
Other labor income and transfer payments	+20.8	+10.5	+12.3	+6.5
Dividends	−31.9	+4.2	−0.5	−13.5
Interest	−2.8	+9.8	+6.2	+3.8
Net rent	+6.5	+2.7	+1.9	−5.8
All of the above	−0.5	+7.9	+5.8	+4.0
Total personal income				
Actual	−7.7	−1.9	−1.1	−0.7
Estimated, using				
1913 weights (table 9.9, col. 1)	−8.3	−2.8	−3.0	−5.5
1937 weights (table 9.9, col. 3)	−7.7	−1.4	−2.3	−4.5
1948 weights (table 9.9, col. 4)	−6.7	−1.9	−2.3	−4.3
1960 weights (table 9.9, col. 6)	−4.1	+0.7	−0.7	−2.4
1981 weights (table 9.9, col. 8)	−1.2	+3.0	+1.4	−0.6

Note: Percentage changes in 1937–38 and 1948–49 based on Creamer 1956, xxix; in 1948–80 and 1981–82 based on Cullity 1983, table 2. Also see text and table 9.9.

effects on government finance, security markets, and, most important, real capital formation by business firms and households. The expansion of government employment, in relative as well as absolute terms, contributes to the taxpayers' burden. And there are still other possible complications that the simple global estimates in table 9.10 neglect: it may be important to separate the effects of changing compensation rates and input volumes and to take account of finer distinctions, for example, the relative importance of durables, nondurables, and services in generating personal income. These qualifications were already made by Creamer and Moore in 1956.

Nevertheless, as projected in that volume nearly thirty years ago, fluctuations in income that accompany business cycles did moderate significantly, and there can be little doubt that the trends in the composition of personal income by major types and sources made a substantial contribution to this development.[12]

9.9 Growth Rates and Variability of Economic Change

Although it is true for the period since 1945 as a whole that contractions have become shorter and milder, there is nonetheless a useful distinction to be made between the first two decades and the next one. In the 1950s and 1960s high long-term growth rates prevailed in the United States economy as well as among its major trading partners. Domestically, high inflation was not yet perceived to be a persistent and grave problem with no easy, apparent solution, and neither was high unemployment so perceived. Looking back, contemporaries had little doubt about the contrast between these economically rather placid and prosperous decades and the turbulent times that followed, dominated by seemingly uncontrollable inflation, more frequent and serious recessions, energy problems, and financial instability.

To put such impressionistic comparisons on firmer ground, table 9.11 divides the United States economic record since 1903 into six periods, each covering from two to four complete business cycles measured from peak to peak. Three of these show average annual growth rates in real GNP (g) varying from 3.4% to 3.9%: 1903–13, 1923–29, and 1948–69. The other three are characterized by considerably lower long-term growth ranging from 2.4% to 2.8% per year: 1913–23, 1929–48, and 1969–81 (col. 7).[13]

To measure relatively high and low economic stability, we use standard deviations of the annual growth rates in real GNP (w). It turns out that variability in growth was generally greater in the slower growth periods (cols. 7 and 8). In addition, the more recent periods in both groups showed less variability than the earlier periods, confirming the point made above regarding the reduced severity of recessions since World War II.[14]

It is also of interest to observe that the proportion of time spent in contraction was 15% in 1948–69 and 24% in 1969–81. Even this last figure is much lower than the corresponding statistics for the earlier

12. For further evidence, particularly concerning the role of government expenditures and transfer payments, see Beck 1980 and Cullity 1983.

13. See Zarnowitz (1981, 476–80) for a discussion of how these periods were selected, references to related literature, and an attempt to push the comparison back to 1882.

14. Both 1913–23 and 1929–48 include large wartime expansions as well as major depressions (with the latter outweighing the former as regards growth effects but all contributing to high variability).

Table 9.11 Average Growth Rates and Variability of Economic Change, Selected Periods, 1903–81

Period[a] (1)	Number of Years Covered[b] (2)	Number of Business Cycles Covered[c] (3)	Number of Months[d] in		Percentage of Time in Contraction[e] (6)	Growth in Real GNP (%)	
			Contraction (4)	Expansion (5)		Average[f] (7)	SD[g] (8)
			Periods of Relatively High Growth				
1903–13	10	3	60	64	48.4	3.4	6.1
1923–29	6	2	27	48	36.0	3.5	3.8
1948–69	21	4	39	214	15.4	3.9	2.6
Total	37	9	126	326	27.9	3.7	3.7
			Periods of Relatively Low Growth				
1913–23	10	3	48	76	38.7	2.4	8.6
1929–48	19	3	64	167	27.7	2.5	9.4
1969–81	12	3	33	106	23.7	2.8	2.9
Total	41	9	145	349	29.4	2.6	7.2

Source: Kendrick 1961 (GNP in 1958 dollars, 1903–8); U.S. Department of Commerce, Bureau of Economic Analysis (GNP in 1958 dollars and in 1972 dollars, 1909–81). Most of the historical data and measures are taken from the U.S. Department of Commerce, Bureau of Economic Analysis 1973.

[a]For each period listed, the initial and terminal dates are business cycle peak years according to the annual reference chronology of the NBER.

[b]Number of complete years covered.

[c]Number of complete peak-to-peak cycles from the initial to the terminal year.

[d]Count based on the NBER monthly reference chronology.

[e]Entries in col. 4 are divided by the sums of entries in cols. 4 and 5 and multiplied by 100.

[f]Average annual compound growth rate between the initial peak and the terminal peak years, in percent.

[g]Standard deviation of the annual growth rates for all years in the given period (as identified in cols. 1–2).

periods (cf. cols. 4–6). These measures indicate no correspondence between the average growth rates and the relative duration of contractions. Thus in 1903–13 and 1923–29, when growth was relatively high, the percentage of time accounted for by business contractions exceeded that in 1929–48 and 1969–81, periods with lower growth rates.

Strong inflationary trends prevailed in 1913–23 and 1969–81, when monetary aggregates expanded rapidly but real growth was relatively weak. In the other periods, inflation was fairly moderate or absent. Table 9.12 shows the average annual growth rates (%) in real income, the stock of money, nominal income, and the implicit price deflator (g, m, y, and p, respectively.[15] The periods with relatively high real growth (on the left) had on the average lower m, y, and p rates than the periods with lower real growth (on the right).

9.10 Changes in the Cyclical Behavior of Prices

Reference cycle patterns provide a simple and useful device for describing the movements of a series during business cycles. The series is divided into segments, each of which covers one business cycle dated from the initial to the final trough. A pattern consists of nine averages, one for each of the consecutive stages of the cycle. Stages I, V, and IX are three-month periods centered on the initial trough, peak, and terminal trough of a business cycle, respectively. Stages II, III, and IV cover successive thirds of the expansion (trough to peak), and stages VI, VII, and VIII cover similar portions of the contraction (peak to trough). All measures are in "reference cycle relatives," that is, percentages of the average standing of the data during the given business cycle. The procedure retains the intracycle trend but eliminates the

Table 9.12 **Average Annual Growth Rates of Real and Nominal Income, the Money Supply, and the Implicit Deflator**

Years	g	m	y	p	Years	g	m	y	p
1903–13	3.4	6.1	5.4	2.0	1913–23	2.4	8.8	8.2	4.9
1923–29	3.5	4.1	3.4	−0.2	1929–48	2.5	5.3	4.2	2.0
1948–69	3.9	4.7	6.2	2.3	1969–81	2.8	9.7	10.0	7.0
Average	3.7	5.0	5.0	1.4	Average	2.6	7.9	7.5	4.6

15. The measures for 1903–48 are calculated from annual data listed in Friedman and Schwartz 1982, table 4 (following p. 121). They refer to the sum of currency held by the public plus adjusted deposits at all commercial banks; national income or net national product; and the corresponding implicit price deflator. The measures for 1969–82 are based on data on M2, GNP, and IPD as given in the Economic Report of the President, February 1984, 220, 224, and 291.

intercycle trend because the average relative for each cycle is one hundred. Note that reference cycle stages differ in duration, as do the individual business cycles. For certain purposes, therefore, such as comparisons of leads and lags at turning points, measures in fixed calendar-time units may be preferable. But an analysis of the patterns can be very revealing in some contexts. This is so in particular with respect to the identification of any major and persistent changes in broadly defined cyclical movements, which is our concern here.

We have plotted and inspected thirty reference patterns for United States wholesale prices, one for each of the complete business cycles since 1854. The first impression is one of great variability, but a closer analysis helps to explain the main differences and bring out the more persistent traits. The intracycle portions of the longer trends are often strong enough to have pronounced and readily visible effects. Thus in 1854–61 a downward local drift came to dominate the longer upswing in prices, and then between 1864 and 1896 there was a long downswing that, however, flattened temporarily in 1885–91.[16] Accordingly, the seven patterns covering the periods 1854–61, 1867–85, and 1891–97 have clear downward tilts. Between 1896 and 1920 prices tended to move up, with some leveling off in 1910–14. This left an impress upon the several corresponding patterns. The weakness of prices in 1920–32 shows up in the downward-tilted patterns for this period, and their subsequent upward trend in the upward-tilted patterns for the post–1933 cycles.

Major wars had huge effects on the behavior of prices. The patterns for 1861–67 (stages I–IV), 1914–19 (I–VI), and 1945–49 (I–IV) show the surging inflations of the Civil War and World War I and the slower, more suppressed inflation of World War II. The inflations of the Korean War and Vietnam War are much less conspicuous in the patterns for 1949–54 (III–V) and 1961–70 (III–IX). After the Civil War, a strong deflation followed immediately; after World War I, prices first stabilized and then fell sharply in the 1920–21 depression; but no strong downward movements in the price level trailed any of the later wars.

The most important findings are as follows. Virtually all business cycle contractions through 1938 were associated with some declines in prices during at least some of their stages. When the trend was down, these declines would often start during the expansions and last longer, but they would also typically accelerate after the peak stage (V). When the trend was up, the rising segments of the patterns tended to be larger and longer, frequently starting before the trough and extending beyond

16. For the chronology of the "long waves" in prices, see table 9.2. On the shorter "local" trends superimposed on these waves, see Burns and Mitchell 1946, 438–40 with chart 65.

the peak, but the contractions would still witness some significant price-level declines (mainly between stages VI and IX). The only early patterns that show very weak and irregular price movements, in the 1885–91 period, refer to two short and marginal cycles, an interlude of relative stability separating major fluctuations dominated by strong deflationary developments in the early 1880s and 1890s.

The more recent cycles present a sharply contrasting picture. The brief and peculiar end-of-the-war contraction of 1945 was accompanied by essentially flat wholesale prices. This year saw the end of wartime price controls. The last contraction during which prices fell significantly occurred in 1948–49. The Korean expansion saw new partial wage and price controls and had a phase in 1951 during which prices declined considerably, but in the ensuing contraction they merely stabilized after a new bout of wartime inflation. The stability persisted through most of the 1954–57 expansion, too, but prices started rising again moderately late in the 1957–58 contraction and during the short recovery of 1958–60, which alarmed many observers since there was little evidence of excess demand. This ended with the recession of 1960, and several years of relatively stable prices followed. With the intensification of the Vietnam War in the mid-1960s, a new and much more intensive round of inflation began, which the 1970 recession and the 1971 wage and price controls slowed down only a little and for only a short time. After the series of supply shocks in 1973–74 (sharp rises in prices of food, oil, and other raw materials worldwide, termination of United States price controls, and aftereffects of the switch to floating exchange rates), inflation accelerated strongly late in the 1973–75 recession and again in the middle stages of the 1975–80 expansion, partly owing to new supply shocks. It took a protracted period of poor business conditions in the early 1980s (two contractions separated by a weak one-year recovery) to reduce the pace of inflation substantially. As a group, the post–World War II patterns, marked by an absence of any major absolute declines in prices, are strikingly different from any comparably large subset of earlier patterns where deflation associated with business contractions was the rule.

By averaging the individual reference patterns stage by stage over some sufficiently long period, one may hope to bring out the typical features in the cyclical behavior of the variable concerned. The assumption underlying the procedure is that such persistent traits indeed exist; the more valid this premise is, the more useful the method.

The upper panel in figure 9.1 shows five average reference cycle patterns based on the measures for the overall wholesale price series used in figure 9.1. The first pattern, for the nine cycles of 1854–97, reflects weak rises during expansion and strong declines during contraction: the typical behavior in a period of long-run downward trend

in prices. The second, for the five cycles of 1897–1914, when the long drift was up, shows a longer and stronger rise and weaker decline. The third, for 1919–38 (five cycles), shows very large and more symmetrical cyclical movements, with a relatively small downward tilt. The average for the nineteen cycles, 1854–1938, omitting the war-related episodes, is a nearly symmetrical, slightly downward-tilted pattern rising between each of the stages I–V and falling between each of the stages V–IX. In clear contrast, the averages for the seven cycles 1949–82 describe a steadily rising pattern, although one whose slope is definitely lower in the contraction segment V–IX than in the expansion segment I–V. In this period the contractions were associated with a lower, but not a negative, rate of inflation. Similar results for the period since 1919 are obtained from an analysis of the index of wholesale prices for industrial commodities only (omitting farm products and foods). The average reference patterns for 1919–38 and 1949–82 closely resemble their counterparts for the all-commodity index.

Cagan (1975, 90) concluded that "The failure of the aggregate index of wholesale prices to decline in the recessions of 1954 and 1958 and then again in 1961, which contrasted with the sharp declines of previous recessions, was a new phenomenon." Our results confirm this observation on the basis of longer series than those used by Cagan (his measures cover the period 1891–1970; ours cover 1854–1982).

It has been suggested that the post-1969 change in the observed behavior was due to the convergence of downward rigidities owing to the increased market power of firms over prices and of labor unions over wages. Whether such developments did in fact occur on a sufficiently large scale has been questioned by some authors but accepted by others (Cagan 1975, 90; DeLong and Summers, this volume, chap. 12). Another hypothesis is that after the Employment Act of 1946 the successive administrations demonstrated their commitment to combating unemployment so that people came to believe that contractions long or severe enough to generate any persistent deflationary movements would be effectively prevented. This explanation, which appears to be generally consistent with the evidence, is closely related to the more recent emphasis on the effect of a credible policy posture on expectations of changes in the price level (Fellner 1980).

It is difficult to measure anticipated rates of inflation, but their role is undoubtedly basic. Cagan compared the average annual rates of change in wholesale prices during the successive expansions and contractions (to be denoted E and C) and computed the differences $C - E$. This procedure amounts to using the preceding expansion rates as (admittedly rough) proxies for the anticipations. In table 9.13 we bring Cagan's results up to date. After 1949, prices ceased declining during contractions: the signs of C change from negative to positive (see cols.

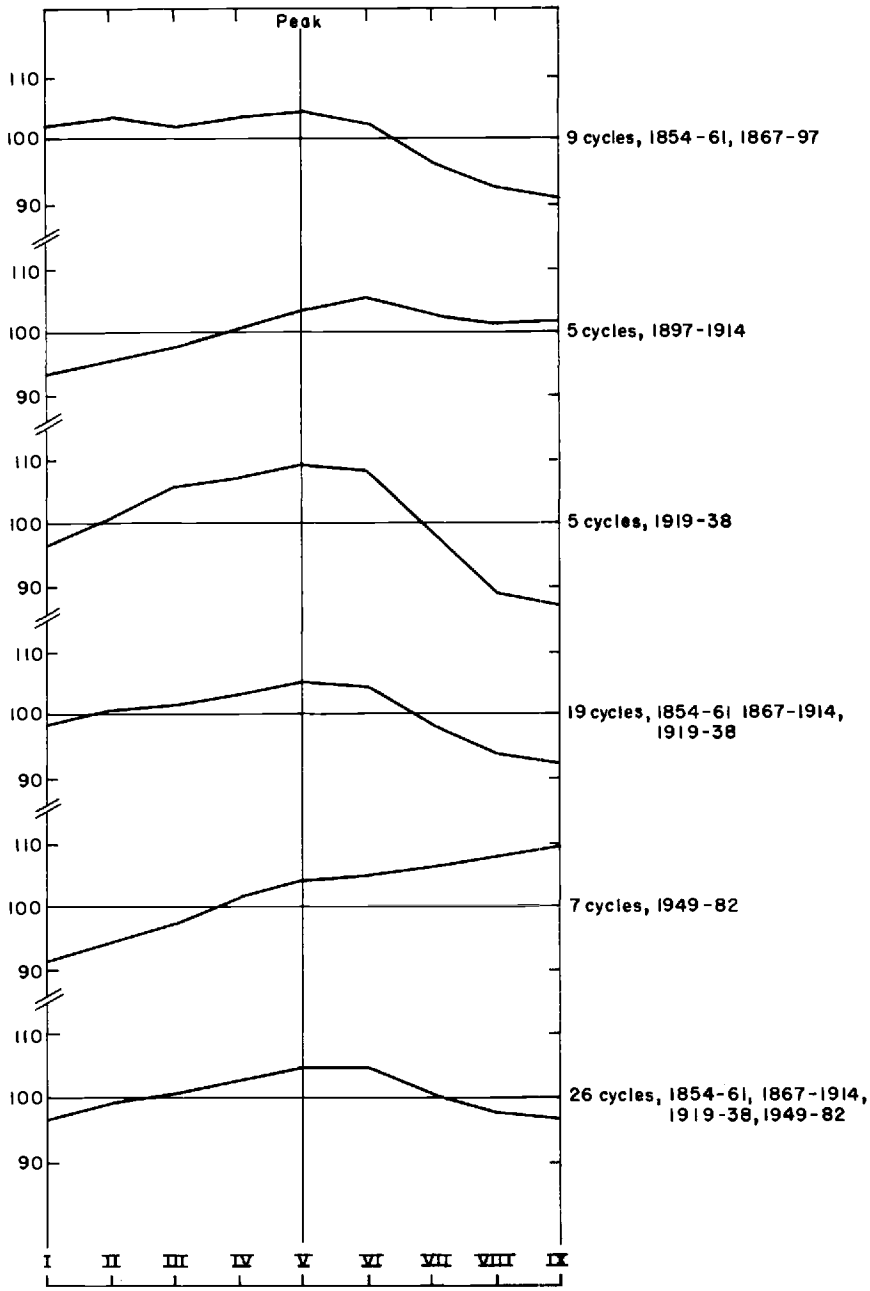

Fig. 9.1 Wholesale prices, all commodities, average reference patterns, 1854–1982. *Source*: Warren/Pearson (1854–90); U.S. Department of Labor, Bureau of Labor Statistics (1890–1982).

3 and 6). The differences $C - E$ have consistently negative signs in the seventeen cycles from 1891 to 1958 (cols. 4 and 7). The C rates, even where positive or zero as in 1945, 1953–54, and 1957–58, were smaller than the E rates. In the four cycles between 1958 and 1980, however, the $C - E$ differences turned positive as well.[17] The price response measured in these terms declined consistently in each of the six successive business cycles 1945–75. Only in 1980–82 did $C - E$ result in a negative sign, marking a decidedly disinflationary phase (col. 7).

The wholesale price data make it clear that the magnitude of the post–World War II inflation in the United States was due not to an intensification of upward price pressures during business expansions, but to the increased length of expansions and the new persistence of such pressures during contractions. The average percentage increases of prices per year were very similar in the prewar and postwar expansions (6.3% and 6.4% during 1891–1945 and 1945–82, respectively) but very different in the prewar and postwar contractions (−6.4% and 3.3%, respectively).

Prices have been very sensitive to the severity of business contractions. In 1891–1945 the wholesale price index fell at an average annual rate of 15% in the five major depressions (MD), 4% in the four severe recessions (SR), and 0.6% in the four mild recessions (MR). The corresponding average differences $C - E$, in percentage points, are −21, −12, and −6. In 1945–82 there were no major depressions, but in the five severe recessions the price index rose 2% per year, and in the three mild recessions it rose 5%. The $C - E$ differential was −6 for the five SR and +1.6 for the three MR. Thus in both periods prices were responsive to the severity of business declines, but it is clear that the response to recessions of comparable severity decreased substantially.

Detailed studies of wholesale price changes in the nonwar recessions of the 1920s and 1948–70 (Cagan 1975) indicate that these results are not attributable to the changing composition of the index. However, many raw materials prices retained their usually high cyclical sensitivity.

In a recent analysis of a broad spectrum of price and wage series for selected periods (1900–1914, 1923–29, and 1949–66), Schultze (1981) argued that until the 1960s low inflation "norms" in the nature of inert rules of thumb dominated price-level expectations and behavior. In his comments on Schultze's paper, Fellner (577–81) disputed this hypothesis partly on the grounds that Schultze's sample includes mainly years

17. It should be remembered that these measures are averages in percent per year. Taking into account the different durations of expansions and contractions and the lengthening lags in prices, it is still true that some disinflation accompanied or followed each of the recessions concerned.

Table 9.13 **Rate of Change of Wholesale Prices over Business Cycles, 1891–1982**

Business Cycle[a]	Severity of Contraction[b] (1)	Percent per Year[c] Expansions (E) (2)	Contractions (C) (3)	Difference, $C - E$ (4)	Averages[d]	Percent per Year[c] Expansions (E) (5)	Contractions (C) (6)	Difference, $C - E$ (7)
1891–93–94	MD	−0.9	−12.4	−11.5	1891–1914 (7)	4.3	−3.2	−7.5
1894–95–97	SR	1.7	−4.5	−6.2	1919–38 (5)	7.0	−13.0	−20.0
1897–99–1900	MR	6.3	5.0	−1.3	1945–61 (4)	4.8	−1.3	−6.0
1900–02–04	MR	4.6	−0.7	−5.3	1961–82 (4)	8.1	7.9	−0.2
1904–07–08	MD	3.7	−4.0	−7.7				
1908–10–12	MR	8.3	−4.0	−12.3	1891–1945			
1912–13–14	SR	6.1	−1.8	−7.9	MD (5)	6.3	−14.7	−21.0
1914–18–19	SR	18.8	−4.1	−22.9	SR (4)	7.8	−3.9	−11.7
1919–20–21	MD	19.9	−33.8	−53.7	MR (4)	5.2	−0.6	−5.8
1921–23–24	SR	4.8	−5.3	−10.1	All cycles (14)	6.3	−6.4	−12.8
1924–26–27	MR	1.6	−2.6	−4.2				
1927–29–33	MD	−0.1	−13.2	−13.1	1945–82			
1933–37–38	MD	9.0	−10.1	−19.1	MD (0)	—	—	—
1938–45–45	n.c.	4.4	1.2	−3.2	SR (5)	8.3	2.3	−6.0
1945–48–49	SR	13.6	−7.1	−20.6	MR (3)	3.4	5.0	1.6
1949–53–54	SR	3.2	0.0	−3.2	All cycles (8)	6.4	3.3	−3.1
1954–57–58	SR	2.3	1.7	−0.6				
1958–60–61	MR	0.1	0.3	0.2	1891–1982			
1961–69–70	MR	1.4	2.6	1.2	MD (5)	6.3	−14.7	−21.0
1970–73–75	SR	8.0	16.4	8.4	SR (9)	8.1	−0.5	−8.5
1975–80–80	MR	8.6	12.1	3.5	MR (7)	4.4	1.8	−2.6
1980–81–82	SR	14.4	0.6	−13.8	All cycles (22)	6.4	−2.9	−9.2

[a]Identified by trough-peak-trough years of the NBER monthly reference cycle chronology.

[b]MD = major depression; SR = severe recession; MR = mild recessions; n.c. = not comparable. For the contractions 1920–82, see also table 9.7.

[c]Computed between average levels of three months surrounding business cycle peaks and troughs. Based on seasonally adjusted data for the index of wholesale (producer) prices, all commodities.

[d]Periods are identified by initial peak and terminal trough cycles. Numbers of cycles covered are given in parentheses.

in which prices had a mild upward trend (in 1923–29 there was a slight downward drift). Had longer and more continuous price series been used, they would have demonstrated more flexible behavior and supported the concept of more "rational" expectations. Indeed, the pre–1920 patterns (see fig. 9.1) seem to us to be broadly consistent with this view.

9.11 Changes in the Cyclical Behavior of Interest Rates

Short-term interest rates historically have exhibited cyclical movements varying from moderate to very large relative to their average levels. During business cycles containing major booms or slumps and affected by financial crises, large monetary disturbances, or wars, fluctuations in rates have often been huge and sudden. Financial markets are particularly sensitive to all types of factors influencing business conditions, so it is well known and not surprising that short rates are typically more volatile than most other important variables. This is well established by an analysis of twenty-seven reference cycle patterns that covers more than 120 years of United States business history.

The patterns for commercial paper rates, 1858–1932, show clear procyclical movements, consistent with the simple notion that the demand for credit tends to increase relative to supply in expansions and decrease in contractions. The single major exception was the long but slow 1933–37 recovery from the worst recorded depression, during which short rates continued to drop sharply. However, the characteristic timing of the rates was predominately lagging, particularly at peaks. Rough coincidences prevailed only at the peaks of 1860–73 and 1923–29. At troughs, the timing was on the average lagging as well but much less consistently so. A few of the patterns (1861–67 and 1888–91 in addition to those related to the depressions of 1920–21 and the 1930s) are quite different from all the others.

The patterns for the three-month treasury bill rate in the seven business cycles 1949–82 have very large amplitudes, which bespeaks heightened sensitivity to cyclical influences.[18] They rise sharply during expansions and fall sharply during contractions, but with much variability in timing. Thus their highest standings are in stages IV (for the 1958–61 cycle), V (1949–54, 1961–70, and 1980–82), VI (1954–58 and 1975–80), and VII (1970–75). Of course in the post–World War II period interest rates generally had rising long-term trends; these were mild in the 1950s and 1960s and strong thereafter, reflecting mainly the course of inflation and the corresponding adjustments of price expectations.

18. Treasury bill rates have become a particularly important and sensitive indicator of money market conditions. Commercial paper rates have somewhat different characteristics than they used to have (Selden 1963), but their reference cycle patterns since 1949 bear a fair family resemblance to the treasury bill rate patterns.

In basis points, the fluctuations in interest rates were very small until the late 1960s, then steadily increased to very large size. It is interesting that the amplitudes of the corresponding patterns do not show a similar trend. That is, relative to their average values in each cycle the movements of bill rates have been about the same in recent cycles as in the 1950s and 1960s, whereas in terms of basis points they were small in the early years when the levels of the rates were low and large in the late years when the levels of the rates were high.

The average reference cycle patterns in figure 9.2 bring out the shifts in amplitude and timing. There is a near symmetry of movement in the diagram for the four earliest cycles covered (1858–79). The averages for the eleven cycles of 1879–1919 show a rise from stage II to VI–VII and a contraction between stages VII and II, that is, lags at both peaks and troughs. The pattern for the five cycles of 1919–38 is strongly downward-tilted, with a rise between stages III and V only (a long lag at troughs). These movements have been large enough to put a strong imprint on the overall averages (compare the patterns for 1919–38 and 1858–1938). In contrast, the diagram for the treasury bill rate in seven cycles, 1949–82, shows a very large rise between stages I and VI and a somewhat smaller decline in the contraction stages VI–IX. The average swing in bill rates since 1949 has been much larger than the average swing in commercial paper rates before 1938.

It is common knowledge that long-term interest rates fluctuate much less than short-term rates; it is perhaps not so well known that they do not conform as well to business cycles. Both properties can be inferred from a comparison of the corresponding reference patterns. In 1900–1914, for example, the only large cyclical movements evident in high-grade industrial bond yields are those associated with the crisis and severe depression of 1907: first a rise in stages III–VII of the 1904–8 cycle, then a decline continuing through most of the recovery from that depression. A somewhat similar sequence occurred in connection with the depression of 1920–21 and the subsequent recovery. The large irregular movements in the great contraction of 1929–33 with a late peak in stage VIII (1931), and the long, first rapid then slow decline throughout the 1933–38 cycle are also notable episodes.

The corporate bond yield patterns for the post–World War II years contain some very large shifts, mostly upward. The timing of these movements has varied widely, with rises occurring between the following stages in each consecutive cycle:

Cycles:	1949–53	1954–58	1958–61	1961–70	1970–75	1975–80	1980–82
Stages:	I–V	I–VI	I–IV	II–VII	III–VII	III–VI	VIII–VI

Consistent with the generally rising trend in yields, lags occurred more frequently at business cycle peaks than at troughs.

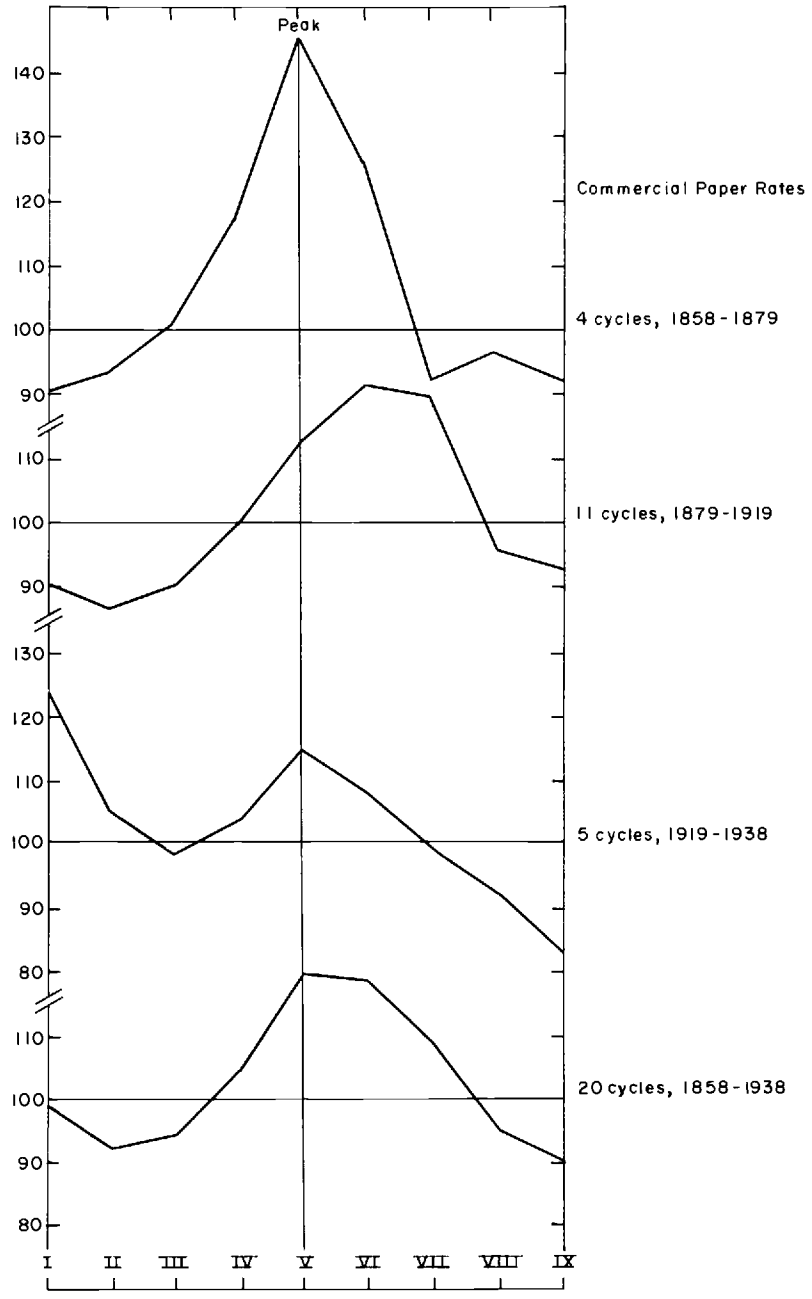

Fig. 9.2 Short-term interest rates, average reference patterns, 1858–1982. *Source*: commercial paper rates, New York City, Macaulay; treasury bill rate, Board of Governors of the Federal Reserve System.

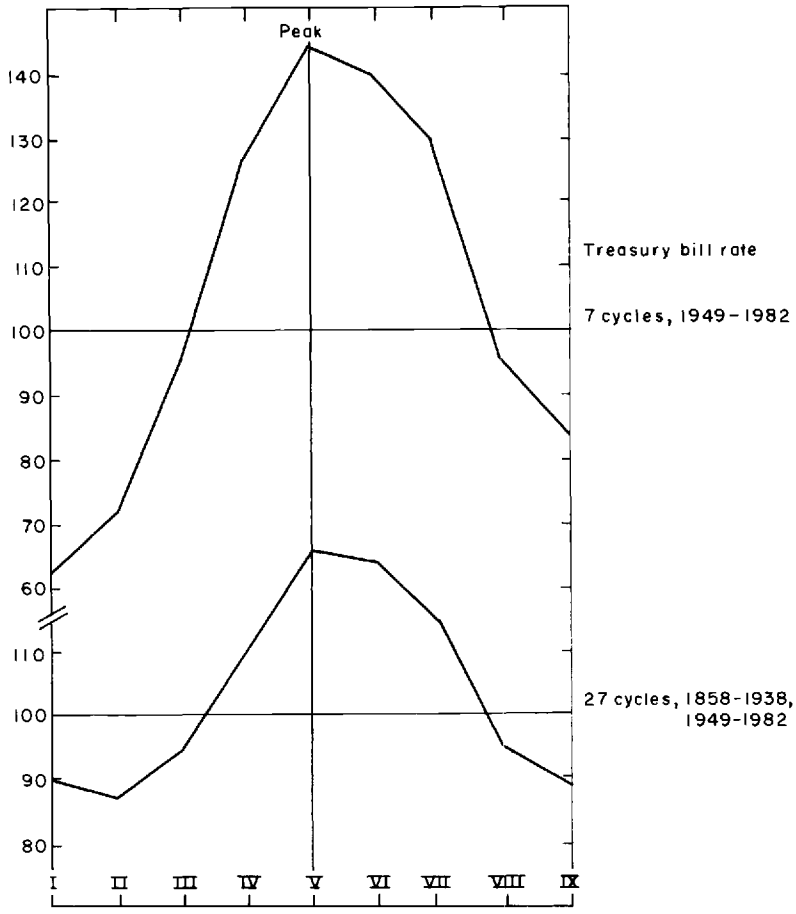

Fig. 9.2 (continued)

The average reference patterns in figure 9.3 provide a bird's-eye view. The overall amplitudes of movement in long rates have increased greatly between 1900–38 and 1954–82, but it is the strong upward trend in the recent period that dominates the average patterns. The intracycle drift tended to be down in the period between the world wars, strongly up in the past thirty years. Nevertheless, the lapping tendency can be traced throughout the twenty-seven-cycle record.

Cagan (1966), comparing the behavior of a broad group of interest rates before World War I, the 1920s, and the 1950s, noted that they may have become increasingly sensitive, conforming to moderate business cycles with larger amplitudes and shorter lags. Our reference cycle patterns are not inconsistent with this result. Table 9.14 indicates that a shift in timing toward shorter lags and more frequent leads did occur

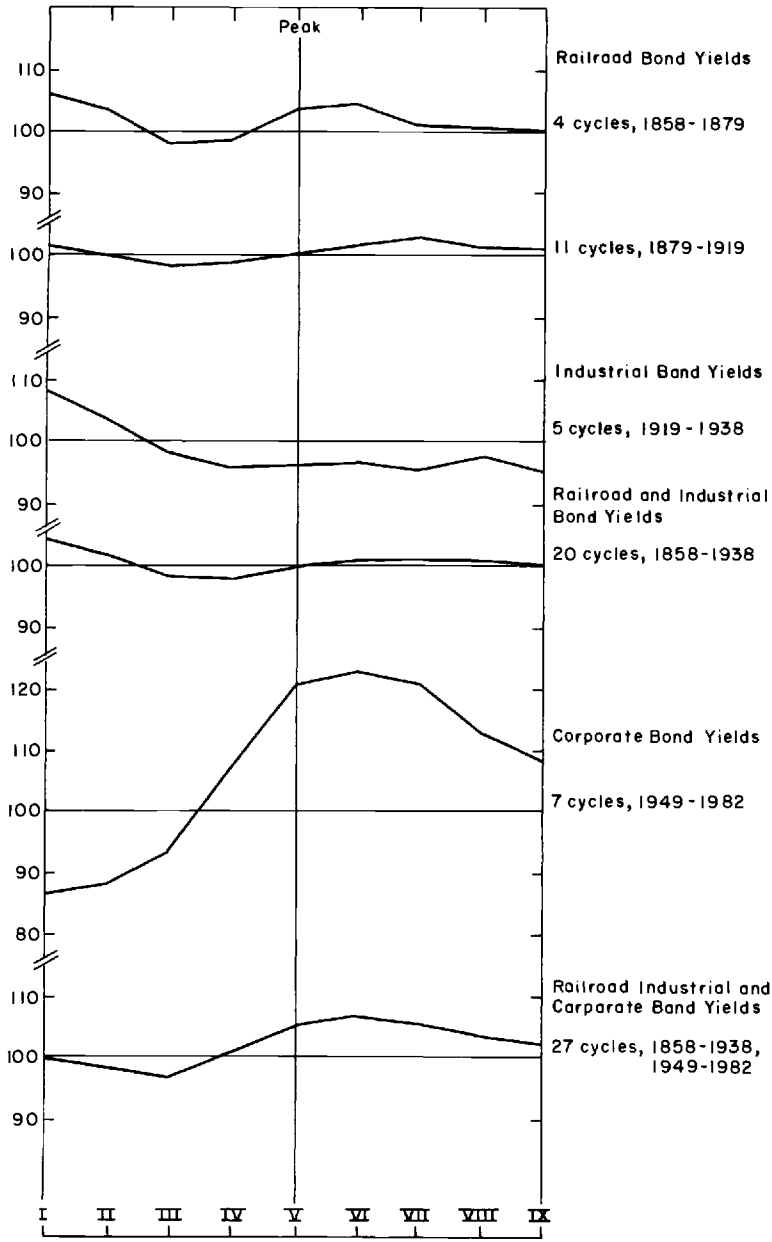

Fig. 9.3 Long-term interest rates, average references patterns, 1858–1982. *Source*: railroad bond yields, Macaulay; industrial bond yields, Standard and Poor's Corporation; corporate bond yields, Citibank and U.S. Department of the Treasury.

in the early post–World War II period (1945–60), but that later the lags reasserted themselves. In 1961–82 the lags were generally longer than in 1919–29, for example. The lags of bond yields behind bill rates also increased between these two periods (compare the first and fourth lines in the "Averages" section). On the whole, lags have prevailed heavily in the timing at troughs for both bills and bonds, but at peaks bills usually led while bonds lagged. The individual timing comparisons show a high degree of dispersion.

9.12 Changes in the Timing of Leading and Lagging Indicators

Since the 1960s, a collection of economic indicators that systematically lead, coincide with, or lag business cycle turning points has become widely used in current economic analysis. The selection of these indicators has been based upon historical measures of the kind employed earlier in this paper, as well as upon hypotheses of economic behavior that yield plausible explanations of the observed leads and lags. Here we examine the historical record of two of the selected groups of indicators with respect to their timing at business cycle peaks and troughs.

The longest available record of the timing of the leading and lagging indicators during business cycles covers nearly a century. In tables 9.15 and 9.16 the median leads or lags of speecific groups of indicators are shown for each business cycle turn between 1885 and 1982. The indicators in the leading group show an unbroken record of leads, while those in the lagging group lag at all except two peaks and three troughs. Moreover, when the turns in the lagging group are compared with the opposite turns in the business cycle, they lead at every turn, and by longer intervals than the leading indicators do. The economic relations between the lagging and the leading indicators are such as to make these results reasonable, according to the considerable literature that has been devoted to the subject (for a summary and list of references, see Moore 1983a, chap. 21).

From 1885 to 1938, the timing record is based upon seventy-five leading and thirty lagging indicators, the classification having been determined in 1950. Since the classification was based on the prior record, it is not surprising that the leading group led and the lagging group lagged. But the consistency over the entire period was not controlled by the method of classification, nor was the relations between the opposite turns in the lagging and leading groups. For the period 1948 to 1982, the record was based upon twelve leading and six lagging indicators selected in 1975. Again the prior record was examined in making the selection. As has been shown elsewhere, however, the behavior of a group of indicators selected in 1950, without benefit of

Table 9.14 **Timing of Turning Points in Treasury Bill Rates and Corporate Bond Yields during Business Cycles, 1919–82**

Business Cycle		Leads (−) or Lags (+), in Months					
		Treasury Bill Rate[a]		Corporate Bond Yield[b]		Bond Yield vs. Bill Rate[c]	
Trough (1)	Peak (2)	Trough (3)	Peak (4)	Trough (5)	Peak (6)	Trough (7)	Peak (8)
March 1919	January 1920		+5	−1	+5		0
July 1921	May 1923	+13	−2	+14	−1	+1	
July 1924	October 1926	+1	−11				
November 1927	August 1929	−2	−3	+5	+1	+7	+4
March 1933	May 1937	+35	−1	+46	−1	+11	0
June 1938	February 1945	+31		+30	−35	−1	
October 1945	November 1948			+6	−9		
October 1949	July 1953		−1	+8	−1		0
August 1954	July 1957	−2	−1	+1	+1	+3	+2
April 1958	May 1960	+2	−5	+2	−4	0	+1
February 1961	November 1969	−2	+2	+25	+7	+27	+5
November 1970	November 1973	+15	+9	+25	+13	+10	+4
March 1975	January 1980	+21	+2	+30	+2	+9	0
July 1980	July 1981	−1	−7	−1	+2	0	+9
November 1982		−1		+6	+7		

	Averages					
Pre-1945						
1919–29	+4	−3	+6	+2	+4	+2
1919–45	+16	−2	+19	−6	+4	+1
Post-1945						
1945–60	0	−2	+4	−3	+2	+1
1961–82	+6	+2	+17	+6	+10	+4
Pre- and post-1945						
All observations	+9	−1	+14	−2	+7	+3
Omitting 1933–45[d]	+4	−1	+10	+1	+7	+2

Source: Cagan 1971, 23–32. Bill rates are seasonally adjusted through 1969, except 1931–47; bond yields are seasonally adjusted 1948–61 only. From 1969 through 1982, unadjusted data are used.

[a]Discount rate on new issues of ninety-one-day treasury bills (percent).

[b]Moody's Aaa.

[c]Entries in col. 7 are based on matched observations in cols. 3 and 5; entries in col. 8, on matched observations in cols. 4 and 6.

[d]The omitted observations are those in lines 5 and 6 of the table above. They were excluded from the averages in Cagan 1971, table 1-1 through 1-4.

Table 9.15 Cyclical Timing of Leading and Lagging Indicators, 1885–1982, at Business Cycle Peaks

Business Cycle Peak	Lead (−) or Lag (+) in Months at Business Cycle Peak			Interval in Months	
	Median Trough, Lagging Group	Median Peak, Leading Group	Median Peak, Lagging Group	Trough in Lagging to Peak in Leading	Peak in Leading to Peak in Lagging
March 1887	−20	−3	+6	17	9
July 1890	−14	−5	+5	9	10
January 1893	−8	−5	+6	3	11
December 1895	−14	−5	+5	9	10
June 1899	−6	−1	+10	5	11
September 1902	−15	−4	+14	11	18
May 1907	−27	−16	+7	9	23
January 1910	−11	−4	+7	7	11
January 1913	−14	−3	+9	11	12
August 1918	−34	−20	+1	14	21
January 1920	−9	−2	+6	7	8
May 1923	−13	−4	+4	9	8
October 1926	−24	−11	−1	13	10
June 1929	−15	−5	+2	10	7
May 1937	−50	−2	+3	48	5
February 6 1945	n.a.	n.a.	n.a.	n.a.	n.a.
November 1948	n.a.	−10	0	n.a.	10
July 1953	−39	−5	+4	34	9
August 1957	−31	−21	+2	10	23
April 1960	−19	−12	+5	7	17
December 1969	−26	−9	+2	17	11
November 1973	−24	−8	+12	16	20
January 1980	−38	−12	+4	26	16
July 1981	−4	−3	+6	1	9
Averages and standard deviations ( )					
All observations	−21 (12)	−7 (6)	+5 (4)	13 (11)	13 (5)
All except 1937	−19 (10)	−8 (6)	+5 (4)	12 (7)	13 (5)

Sources: 1885–1938: Moore 1950, table 11, based on seventy-five leading and thirty lagging series; 1948–82: *Business Conditions Digest*, October 1977, appendix F, and subsequent issues, based on twelve leading and six lagging series.

Note: n.a. = data not available.

Table 9.16 **Cyclical Timing of Leading and Lagging Indicators, 1885–1982, at Business Cycle Troughs**

	Lead (−) or Lag (+) in Months at Business Cycle Trough			Interval in Months	
Businss Cycle Trough	Median Peak, Lagging Group	Median Trough, Leading Group	Median Trough, Lagging Group	Peak in Lagging to Trough in Leading	Trough in Leading to Trough in Lagging
May 1885	n.a.	−6	+2	n.a.	8
April 1888	−7	−2	+13	5	15
May 1891	−5	−4	+12	1	16
June 1894	−11	−4	+4	7	8
June 1897	−13	−9	+18	4	27
December 1900	−8	−5	+6	3	11
August 1904	−9	−9	+6	0	15
June 1908	−6	−6	+8	0	14
January 1912	−17	−13	−2	4	11
December 1914	−14	−1	+10	13	11
April 1919	−7	−3	0	4	3
July 1921	−12	−5	+9	7	14
July 1924	−10	−6	+3	4	9
November 1927	−14	−4	+4	10	8
March 1933	−43	−5	0	38	5
June 1938	−10	−4	+10	6	14
October 1945	n.a.	n.a.	n.a.	n.a.	n.a.
October 1949	−11	−5	+6	6	11
May 1954	−6	−6	+8	0	14
April 1958	−6	−2	+5	4	7
February 1961	−5	−2	+7	3	9
November 1970	−9	−2	+12	7	14
March 1975	−4	−1	+20	3	21
July 1980	−2	−1	+8	1	9
November 1982	−10	−2	n.a.	8	n.a.
Averages and standard deviations ( )					
All observations	−10 (8)	−4 (3)	+7 (5)	6 (8)	12 (5)
All except 1933	−9 (4)	−4 (3)	+8 (5)	5 (3)	12 (5)

Sources: 1885–1938: Moore 1950, table 11, based on seventy-five leading and thirty lagging series; 1948–82: *Business Conditions Digest*, October 1977, appendix F, and subsequent issues, based on twelve leading and six lagging series.

Note: n.a. = data not available.

the *subsequent* record, was quite similar during 1948–75 to the record shown in tables 9.15 and 9.16 (Moore 1983a, chap. 24).

At business cycle peaks the average length of lead of the leading group, 1885–1982, was seven months, with a standard deviation of six months. At troughs the mean and standard deviation were about half as large, four and three months, respectively. There is some evidence in the tables that the leads at peaks have become longer and the leads at troughs shorter since 1948 than before (see below).

The lags of the lagging group average five months at peaks and seven months at troughs, with standard deviations of four and five months, respectively. When the turns in the lagging group are compared with the opposite turns in the business cycle, the leads that emerge are quite long, averaging twenty-one months at peaks and ten months at troughs. They are also quite variable, with standard deviations of twelve months at peaks and eight months at troughs.

What tables 9.15 and 9.16 reveal, then, is an almost unbroken sequence of turning points during successive business cycles over the past hundred years. In view of our finding in section 9.3 that the principal shift in the length of business cycle phases took place after World War II, it is of interest to examine the sequence before and after 1945, as in the following summary:

	Average Interval in Months		
	1885–1938	1948–82	1885–1982
A. Business cycle peak to peak in lagging indicators	6	4	5
B. Peak in lagging indicators to trough in leading indicators	7	4	6
C. Trough in leading indicators to business cycle trough	5	3	4
D. Business cycle trough to trough in lagging indicators	6	10	7
E. Trough in lagging indicators to peak in leading indicators	12	16	13
F. Peak in leading indicators to business cycle peak	6	10	7
A + B + C. Business cycle contraction	18	11	15
D + E + F. Business cycle expansion	24	36	27

Each of the intervals into which the business cycle contraction is broken by these turning points has become shorter, on average, while each of the intervals that constitute the business cycle expansion has become longer. This in itself supports the finding of a major shift in the length of business expansions vis-à-vis contractions, since the intervals between the indicator turning points (though not their sum) are independent of the business cycle chronology.

One other noteworthy feature of tables 9.15 and 9.16 is the evidence that the lengths of the leads or lags at successive turning points are positively correlated. The correlation coefficients (r) are as follows:

	All Observations	*Excluding 1933 and 1937*
At business cycle peaks, 1887–1981		
Trough in lagging and peak in leading	+.46	+.70
Peak in lagging and peak in leading	+.43	+.47
At business cycle troughs, 1885–1982		
Peak in lagging and trough in leading	+.28	+.53
Trough in leading and trough in lagging	+.36	+.36

The correlations are not high, but they are all positive, and they are about as high when opposite turns are compared as when like turns are compared. This gives some support to the hypothesis that cyclical influences run from the lagging to the leading indicators as well as from the leading to the lagging indicators (see Moore 1983a, chap. 23).

Apart from the shift toward shorter recessions and longer expansions and the associated shift in the intervals between turns in the indicators, the most notable feature of the record is the absence of major changes in the timing relationships among the groups of indicators.

9.13 Summary and Conclusions

1. After World War II business cycle expansions in the United States became much longer and recessions much shorter than before. From 1846 to 1945, expansions were one and a half times as long as recessions. From 1945 to 1982, they were four times as long. Recessions also became more uniform in length. Total cycle durations from peak to peak or trough to trough show no significant trend.

2. Historically, expansions have long been relative to recessions when the long-run trend in prices was upward and shorter when the price trend was downward. This is mainly because expansions generate more upward pressure on prices than recessions do. However, we find no association between the rate of inflation during each business cycle and the relative duration of the phases.

3. Business cycle recessions since World War II have been much less severe than before, as indicated by comprehensive measures of employment, production, and real income. Shifts in the industrial composition of employment, changes relating to unemployment and labor force participation, and trends in the distribution of personal income by major sources and types have all contributed to that moderation.

4. Inflation was much higher in 1969–81 than in 1948–69, whereas real growth on the average was lower. In the past, periods of relatively low long-term growth tended to have relatively high variability of annual growth rates. However, the variability of economic change (measured by standard deviations of real GNP growth rates) can be judged low by historical standards in both 1948–69 and 1969–81.

5. The average rates of inflation were very similar in the United States expansions before and after 1945 but much higher in the postwar than in the prewar contractions. The inflation of recent decades can be attributed principally to the (novel) persistence of upward price pressures in contractions, not to an intensification of such pressures in expansions. Wholesale prices have continued to show considerable sensitivity to the degree of severity of business contractions.

6. Short-term interest rates moved with very large relative amplitudes, high positive conformity, and variable timing in the business cycles of 1949–82. Before World War II their movements tended to be smaller relative to the cycle average, and they often had long lags at turning points. Long-term rates continued to lag behind the short rates most of the time and to show much smaller amplitudes of movement and lower conformity to business cycles.

7. The longest available record of the cyclical timing of leading and lagging indicators covers nearly a century. Apart from a shift toward shorter recessions and longer expansions and the associated shift in the intervals between turns in the indicators, the most notable feature of the record is the absence of major changes in the timing relationships among the groups of indicators.

We conclude that various structural, institutional, and policy changes contributed to the evolution of business cycles. The process is continuing. There have been important changes, yet the most basic characteristics and many outward manifestations of the business cycle remain much the same (as illustrated by the timing sequences of the indicators). The cyclical processes are sometimes stretched out and sometimes compressed, depending on long-term trends in growth, inflation, and so forth, as well as on the nature, size, and frequency of outside disturbances.

More intensive research is very much needed on each of the topics we could address only briefly in this overview. In addition, there are other aspects of the changing nature of business cycles that we had to exclude. The most important of these are international. For example, greater conformity of United States exports to business cycles in recent times has been noted by Mintz (1967) and Moore (1983a). Business cycles, and even major fluctuations in positive growth rates, appear to be rather integrated among the industrialized trading countries. The full implications of this fact remain to be analyzed.

Comment

Alan J. Auerbach

Zarnowitz and Moore present a wealth of data on output, employment, prices, and interest rates from the past century, using the business cycle as the unit of time over which these data are broken down, studied, and related. The broad question to which the authors seek an answer is, How has the character of the business cycle changed, both in terms of the behavior of macroeconomic aggregates over the cycle and in terms of the frequency, severity, and longevity of the cycles themselves? The answer is that the post–World War II business cycle has been less severe than before, with expansions lasting longer and contractions just the opposite. Part of this change is associated with a secular shift in output from industries with a strongly cyclical character, such as manufacturing, to those less sensitive to the cycle, such as government. Likewise, the contributions to personal income from such volatile sources as farming and unincorporated business have declined as transfer income, many parts of which are intentionally countercyclical, was rising. I use the word "associated" here rather than caused, because without a specific model or explanation for macroeconomic activity itself, it is really impossible to determine causality from these observed correlations. The authors are usually careful to recognize these limitations, although it is difficult to divorce one's view of the way the world works from the way data are presented and analyzed. I do not wish to offer a blanket criticism of "measurement without theory," if for no other reason than that the associated arguments are by now so well known. Basic information on statistical relationships may be useful and relevant for a number of theories. At certain points, however, I believe the data could have been presented in a more helpful way.

The paper begins with a summary of business cycle activity since 1846, based on figures presented in table 9.1. Here it is evident that, according to the NBER dating of cycles preferred by the authors, contractions have occupied successively less time in the overall business cycle. At this point it is probably appropriate to consider the usefulness of the business cycle as the unit of analysis. Why not, for example, give statistics on average annual output changes over successive ten-year periods? The authors do not offer any explicit justification for their approach, but there must be an implicit view that whatever model is appropriate for describing the economy, dynamic relationships change over time according to what is happening within the business cycle. Two specific arguments in this vein are that economic relationships differ during expansions and contractions or that

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as business cycles change in length the unit of calendar time appropriate for dynamic relationships also changes. Support for this latter view is given in section 9.12, where we see that as the length of contractions has shortened over time, there has been a relatively uniform shortening of the subperiods into which contractions are divided. The same is true in reverse for expansions and their subperiods.

Returning to the paper's presentation of basic trends, we observe in tables 9.2 and 9.3 that from an epoch during which periods of rising and falling prices alternated, we have experienced rising prices during the past half century. As table 9.13 shows us later in the paper, this change in long-run price behavior is associated with the fact that prices no longer fall during contractions rather than with more rapid inflation during expansions. Given the additional fact that expansions now seem to last longer, the mathematics tells us that we are experiencing more inflation than we used to. Here the authors do come a little too close, in my opinion, to an attribution of causality, in saying that this inflation "was due not to an intensification of upward price pressures during business expansions, but to the new persistence of pressures during contractions." This statement may be correct, but table 9.13 reports prices, not pressures.

After presenting the basic facts on output and price variations, the authors seek the reasons for the cycle's changing character. They concentrate on shifts in output and labor force composition, adding that demand management is another possible explanation but that this "topic will not be pursued here." I think they are misleading us a bit. If one looks ahead to the discussion of personal income sources, one finds in table 9.9 that included in the category of personal income that declines least during recessions is "other labor income and transfer payments," which grew from 0.9% of personal income for 1913 to 18.9% in 1981, and "wages and salaries, government," which grew from 4.6% to 11.2% over the same period. Omitting these two sources of growth would leave us with a very different picture of the changing composition of personal income among volatile and nonvolatile sources.

While we are studying table 9.9, let me point out a couple of other problems that make the trend even less obvious. Both relate to the use of personal income rather than a more comprehensive income concept. The third important source of stable income, according to the table, is interest payments. But these are *nominal* interest payments. They may be stable and bigger than they used to be, but the picture would be quite different if real, realized interest payments were included. The same type of correction to include capital gains would be helpful. This problem emphasizes that one cannot divorce statistics from models. Unless consumers are completely myopic, or in some equivalent way constrained, nominal interest income is not an interesting measure.

Turning to another explanation, shifts in output composition have, I believe, clearly contributed to the overall decline in volatility that we have observed. Tables 9.5 and 9.6 show us that nonagricultural employment has been steadily shifting from manufacturing to services, and that cyclical changes in employment are and have always been much smaller in the latter sector than the former.

Finally, the authors turn from their discussion of changes in cycle volatility to the changing behavior of prices and interest rates over the cycle. I have already discussed their findings about prices. I have some difficulty in commenting on their analysis of interest rates, for it is nominal interest rates that they study.

Hence the fact pictured in figure 9.2 that, on average, rates were higher at the end than at the beginning of the trough-to-trough cycles since 1949 is not very surprising, but does not tell us whether the behavior of real rates has changed. The same is true of the generally upward trend in Aaa bond yields pictured in figure 9.3, although here there is also the problem of disentangling the relationship between short and long rates, something that we, as economists, have not done very well as yet. In the study of prices and interest rates, as well as when one looks at sources of personal income, the nose of government policy is clearly observable under their tent, even if Zarnowitz and Moore are struggling to be inhospitable. They do weaken a little in section 9.10 when they present growth rates for the money stock, nominal income, and prices over three periods, but here they do not emphasize cyclical movements.

To conclude, I think that Zarnowitz and Moore have offered us an interesting picture of the changing character of business cycles, organizing and presenting the mass of available data in a very helpful way. They have also presented some evidence for the usefulness of taking the business cycle as a unit of measurement, and about the sources of observed changes in postwar cycles. I would encourage them to present companion statistics on rates of inflation and real interest rates to go along with those already offered on nominal interest rates and price levels. Such additional data, combined with those already presented, could further increase our understanding of how business cycles have changed during the postwar years.

Comment Solomon Fabricant

Along with Auerbach, I welcome the information Zarnowitz and Moore provide on the changing characteristics of business cycles in the United

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States over the past century or so—and I would stress, the information on the persistent characteristics of these cycles.

They entitle their paper "Major Changes in Cyclical Behavior," but of course it covers only *some* major changes, as they explicitly recognize. Other data already in their hands (to judge from this paper and their appendix A, to this volume, on the NBER's business cycle chronologies) could be analyzed or analyzed further. I hope they will do so. And perhaps analyses along other lines could also be added.

I was somewhat surprised to find not even a reference—let alone any discussion or analysis—to a hypothesis on cyclical changes in cyclical behavior suggested by Burns and Mitchell almost forty years ago (Burns and Mitchell 1946, 455–64). Though they claimed only that the hypothesis "may turn out to have substance," coming from these two economists, that is enough to make the hypothesis well worth examining—in the light of developments since World War II, and with more data than Burns and Mitchell used in their very preliminary investigation.

You may (and Zarnowitz and Moore will) remember that in their 1946 volume Burns and Mitchell were concerned with the variation of cyclical behavior over time. They wanted to be reasonably confident that the average cyclical patterns they and their colleagues were constructing would yield useful first approximations to the typical features of business cycles—that changes in cyclical behavior, in other words, were not so pronounced as to discredit the use of averages. Among the possible changes in cyclical behavior they considered were changes within long cycles tentatively marked off by severe depressions. In studying the changes within these periods they observed a difference between the cyclical behavior of industrial activity (measured by pig iron production and deflated bank clearings) and of speculative activity (bond yields, call money rates, and shares traded). The difference suggested their hypothesis: "After a severe depression industrial activity rebounds sharply, but speculation does not. The following contraction in business is mild, which leads people to be less cautious. Consequently, in the next two or three cycles, while the cyclical advances become progressively smaller in industrial activity, they become progressively larger in speculative activity. Finally, the speculative boom collapses and a drastic liquidation follows, which ends this cycle of cycles."

Later, in 1955, Moore himself looked a bit further into the question and found recoveries after severe depressions in output, employment, and profits to be usually faster than after mild contractions (Moore 1961b, 88). In contrast, stock prices usually advanced more rapidly after mild recessions than after severe contractions. Also relevant to the Burns/Mitchell hypothesis is Ilse Mintz's study of the deterioration

in the quality of foreign bonds issued during the 1920s (Mintz 1951). An analysis of the post–World War II period would, I suspect, turn up some interesting parallels to that experience—and some interesting differences.

Also surprising to me was the short shrift given—in all the conference's papers—to the changing characteristics of business cycles outside the United States. Even if business cycles in the United States were our only concern, what we could learn by studying the other countries surely would be helpful. And so would a discussion of changes, if any, in the interrelations among business cycles in the United States and those in other countries. The brief remarks Zarnowitz and Moore leave for the last paragraph of their paper can only be called tantalizing.

Of course, updating the NBER's business cycle chronologies for other countries could be quite a job. However, it might not be as heavy as it seems. Many of the fluctuations in European countries and Japan during their rapid economic growth following the war look more like growth cycles than business cycles. And Zarnowitz and Moore have already provided us with a chronology of growth cycles for these countries, as well as the United States, in table A.8 of appendix A. But the table is unaccompanied by any serious analysis despite the considerable interest expressed in growth cycles during the past fifteen or twenty years.[1] In 1968, for example, Burns suggested the possibility that the classical business cycle might be gradually merging into a cycle in which the rate of aggregate growth continues to fluctuate but remains positive (Burns 1968). On this, too, the passage of time has provided information that could be put to use.

Apart from the question of any "progress toward economic stability," there are questions about differences between mild and severe business cycles, and also between business cycle contractions and retardations (or slowdowns) that are not severe enough to be designated business cycle contractions. Well before World War I some fluctuations were so mild as to be classified as business cycles only with some doubt. Specifically, Zarnowitz and Moore refer (table 9.1, note d) to such slowdowns in 1869–70, 1887–88, and 1899–1900. Another example might possibly be 1926–27. Further, in appendix A they point to changes during 1951–52, 1962–64, and 1966–67 and definitely characterize them as retardations during expansion rather than as business cycle contractions. A review of the changes during these episodes, with regard to the characteristics on which Zarnowitz and Moore dwell (duration, amplitude, extent of diffusion, dates of turns in leaders, etc.), could

1. This gap has been partly filled by a new NBER volume (Moore and Klein 1985) that analyzes growth cycles and cyclical indicators in ten countries (including the United States).

be interesting. And so could a review of the characteristics of the expansion or speedup that followed a slowdown, and of the subsequent "classical" contraction—developments, for example, during 1949–52 and 1952–54, if the period 1949–54 were broken in two. All of this would also contribute further evidence on the question that bothers Auerbach, how useful the business cycle is "as a unit of measurement"—a question that obviously also bothered Burns and Mitchell, and to which they devoted a good deal of space in their 1946 volume.

Three things are obvious, to me at least, viewing Zarnowitz and Moore's paper in the context of the conference as a whole. First, the kind of business cycle research that Zarnowitz and Moore do is not at all "fancy," judged by contemporary econometric standards or practices. Second, it requires a lot of hard and careful digging into historical data, as well as good judgment in putting the data to use. This is a task in which—so far, at any rate—mathematics and computers can be of only limited assistance. And third, as is demonstrated in their papers, it can yield results that, though clearly of limited compass, do throw light on the question before this conference—the question of continuity and change in business cycles.

Discussion Summary

The major part of the discussion focused on the clear methodological difference between this paper and all the other papers presented at this conference. Stanley Fischer first drew attention to the fact that although several other papers had paid homage to Mitchell's reference cycle method, they all had inevitably ended up conducting their investigations in the time domain. Moore noted that Blanchard and Watson stated they had decided against the reference cycle approach because it offered no way to conduct rigorous tests of hypotheses, whereas Moore believed that many hypotheses could be and had been rigorously tested in this way. Examples abound in the business cycle studies of the NBER. Sims responded that calendar time was preferable to reference cycles for a number of reasons. In a vector autoregression system it is possible to use the data explicitly to formulate a distribution over the system's forecasts. One can then test how well the estimated system tracks the economy. In a reference cycle framework such forecasts and tests are more difficult because the researcher does not know what the length of the current cycle will be.

Some participants contended that theoretical justifications for the use of the reference cycle technique are also weak. Sims remarked that

it is possible to construct linear models that exhibit stationary random fluctuations. In general, however, the times between peaks and troughs vary widely in such models. He also noted that even when the reference cycle is the true model, the usefulness of time series methods is not ruled out. Lawrence Summers elaborated on this point, stating that results obtained by his graduate students supported this view. He found that VARs were able to capture asymmetries over successive business cycles. (See the DeLong/Summers paper on symmetry in this volume following the Blanchard/Watson paper [chap. 2].) Moore remarked that the cyclical behavior of a series is dependent on the sampling period used and said he understood that VARs were sensitive to the choice of the sampling period. Sims responded that this is less true now, since it appears that monthly VAR systems are often able to track both short- and long-term movements in variables quite well.

As an addendum to this discussion, Zarnowitz notes that the prevailing procedure in applied econometrics is to use discrete-time fixed unit periods on the implicit assumption that the timing interval of the given model coincides with the data sampling interval. The two intervals, however, need not be equal, and where they are not major errors may well result (as shown in recent papers by Christiano and others). In short, the results of empirical analyses can be highly sensitive to the timing specifications of a model, yet the latter are often arbitrary and seldom tested. How stable over time the decision lags are is also generally unknown, but it is clear that some important timing relations vary rather systematically over the business cycle; for example, the average delivery periods ("vendor performance") lengthen in expansions and shorten in contractions. The related problems of the proper choice of the time units and the variability of the lags are both important and in need of much further study: strong claims of knowledge about how to treat them seem to be lacking foundation at present.

References

Baily, Martin N. 1978. Stabilization policy and private economic behavior. *Brookings Papers on Economic Activity* 1:11–60.

Beck, Morris. 1980. The public sector and economic stability. In *The business cycle and public policy, 1929–80*, 105–29. A compendium of papers submitted to the Joint Economic Committee, Congress of the United States. Washington, D.C.: Government Printing Office.

Bednarzik, Robert W., and Deborah P. Klein. 1977. Labor force trends: A synthesis and analysis. *Monthly Labor Review* 100 (October):3–12.

Bowers, Norman. 1981. Have employment patterns in recessions changed? *Monthly Labor Review* 104 (February):15–28.

Burns, Arthur F. 1968. The nature and causes of 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.

Cagan, Phillip. 1971. Changes in the cyclical behavior of interest rates. In *Essays on interest rates*, ed. Jack M. Guttentag, 2:3–34. New York: National Bureau of Economic Research.

———. 1975. Changes in the recession behavior of wholesale prices in the 1920s and post–World War II. *Explorations in Economic Research* 2 (Winter):54–104.

Creamer, Daniel. 1956. *Personal income during business cycles*. Princeton: Princeton University Press. Foreword by Geoffrey H. Moore.

Cullity, John P. 1983. The changing structure of personal income and business cycles in the 1980's. Mimeographed. Center for International Business Cycle Research, Columbia University.

Easterlin, Richard A. 1968. *Population, labor force, and long swings in economic growth: The American experience*. New York: Columbia University Press.

Fellner, William. 1980. The valid core of the rationality hypothesis in the theory of expectations. *Journal of Money, Credit and Banking* 12 (November):763–87.

Flaim, Paul O. 1979. The effect of demographic changes on the nation's unemployment rate. *Monthly Labor Review* 102 (March):12–23.

Friedman, Milton, and Anna J. Schwartz. 1963. *A monetary history of the United States, 1867–1960*. Princeton: Princeton University Press.

———. 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.

Fuchs, Victor R. 1968. *The service economy*. New York: Columbia University Press.

Gordon, R. A. 1969. The stability of the U.S. economy. In *Is the business cycle obsolete?* ed. Martin Bronfenbrenner, 3–33. New York: Wiley-Interscience.

Haberler, Gottfried. 1964. *Prosperity and depression*. Cambridge: Harvard University Press. Originally published by the League of Nations, 1937.

Heller, Walter W. 1966. *New dimensions of political economy*. Cambridge: Harvard University Press.

Jerome, Harry. 1926. *Migration and business cycles*. New York: National Bureau of Economic Research.

Kendrick, John W. 1961. *Productivity trends in the United States*. Princeton: Princeton University Press.

Keynes, John M. 1936. *The general theory of employment, interest, and money*. London: Macmillan.

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.

Lilien, David M. 1982. Sectoral shifts and cyclical unemployment. *Journal of Political Economy* 90 (August):777–93.

Macaulay, Frederick R. 1938. *Some theoretical problems suggested by the movements of interest rates, bond yields and stock prices in the United States since 1856*. New York: National Bureau of Economic Research.

Mills, Frederick C. 1926. An hypothesis concerning the duration of business cycles. *Journal of the American Statistical Association* 21 (December):447–57.

Mincer, Jacob. 1966. Labor-force participation and unemployment: A review of recent evidence. In *Prosperity and unemployment*, ed. R. A. Gordon, and M. S. Gordon, 73–112, New York: John Wiley.

———. 1967. Research in labor force and in unemployment. In *Forty-seventh annual report*, 16–22, New York: National Bureau of Economic Research.

Mintz, Ilse. 1951. *Deterioration in the quality of foreign bonds issued in the United States, 1929–1930*. New York: National Bureau of Economic Research.

———. 1967. *Cyclical fluctuations in the exports of the United States since 1879*. New York: National Bureau of Economic Research.

Mitchell, Wesley C. 1927. *Business cycles: The problem and its setting*. New York: National Bureau of Economic Research.

Moore, Geoffrey H. 1950. Statistical indicators of cyclical revivals and recessions. Occasional Paper 31, National Bureau of Economic Research.

———, ed. 1961a. *Business cycle indicators*. 2 vols. Princeton: Princeton University Press.

———. 1961b. Leading and confirming indicators of general business changes. In *Business cycle indicators*, ed. Geoffrey H. Moore, vol. 1. Princeton: Princeton University Press.

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

———. 1983b. Some secular changes in business cycles. In *Business cycles, inflation, and forecasting*, 2d ed., by Geoffrey H. Moore, chap. 10. Cambridge, Mass.: Ballinger. Originally published 1974.

Personick, Valerie A. 1983. The job outlook through 1995: Industry output and employment projections. *Monthly Labor Review* 106 (November):24–36.

Sachs, Jeffrey. 1980. The changing cyclical behavior of wages and prices, 1890–1976. *American Economic Review* 70 (March):78–90.

Schultze, Charles L. 1981. Some macro foundations for micro theory. *Brookings Papers on Economic Activity*, 2:521–76.

Schumpeter, Joseph A. 1939. *Business cycles*. 2 vols. New York: McGraw-Hill.

Selden, Richard T. 1963. Trends and cycles in the commercial paper market. Occasional Paper 85, National Bureau of Economic Research.

Thorp, Willard L. 1926. *Business annals*. New York: National Bureau of Economic Research.

———. 1932. The depression as depicted by business annals. News-Bulletin no. 43, National Bureau of Economic Research.

U.S. Department of Commerce, Bureau of Economic Analysis. 1973. *Long term economic growth, 1860–1970*. Washington, D.C.: Government Printing Office.

Warren, George F., and Frank A. Pearson. 1933. *Prices*. New York: John Wiley.

Zarnowitz, Victor. 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.

———. 1985. Recent work on business cycles in historical perspective: A review of theories and evidence. *Journal of Economic Literature* 23 (June): 523–80.