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WHAT IS A BUSINESS CYCLE?

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ABSTRACT

This paper considers the question in its title from several angles. Part 1 looks at economic history and the development of thinking about business cycles - the popular meaning and economists' definitions and ideas. Part 2 reviews the lessons from business cycle chronologies and duration data, the concepts of periodicity of cycles and phases, and the apparent moderation of macroeconomic fluctuations in the second half of the 20th century. Part 3 compares the recent business cycles and growth cycles for several major industrialized, market-oriented countries. Part 4 discusses the role of endogenous cyclical variables, the outside shocks of various types, the systematic timing sequences, and the regularities of cyclical comovements and amplitudes. Understanding business cycles is aided by each of these models of analysis.

Business cycles have varied greatly over the past 200 years in length, spread, and size. At the same time, they are distinguished by their recurrence, persistence, and pervasiveness. They make up a class of varied, complex, and evolving phenomena of both history and economic dynamics. Theories or models that try to reduce them to a single causal mechanism or shock are unlikely to succeed.

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What is a Business Cycle?

1.	The Emergence of Business Cycles in History and Economic Thought	2
1.1	Early Observations and Interpretations	2
1.2	Popular Meaning	4
1.3	Economists' Definitions	7
1.4	Past Views of the Scope and Nature of Business Cycles	10
1.5	New Developments and Ideas	12
1.6	Some Basic Reflections and Further Steps	16
2.	The Changing Dimensions of Business Cycles	17
2.1	The Historical Reference Cycle Chronologies on the NBER	17
2.2	A Cautionary Note	20
2.3	The Last-Half Century: Long Expansions, Short Contractions	22
2.4	Phase Durations in Eras of Inflationary and Deflationary Trends	24
2.5	Some Other Analytical Uses of the Duration Data	26
2.6	On Theories and Evidence Relating to Periodic Business Fluctuations	28
2.7	The Moderation of U.S. Business Cycles	30
3.	Some International Comparisons of Cyclical Movements and Growth Trends	33
3.1	The Major Market Economies After World War II	33
3.2	Estimated Dimensions of Business Cycles in Eight Countries	34
3.3	Possible Reasons for the Observed Differences	38
3.4	Growth Cycles	40
4.	The Observed Tendencies, Disturbances, and Regularities	43

4.1	Endogenous Cyclical Variables	43
4.2	Exogenous Variables and the Role of Money	45
4.3	Monetary, Real, and Expectational Shocks	46
4.4	Leads and Lags	53
4.5	Comovements and Amplitudes	57
5.	General Conclusions	60

Sober men, whose projects have been disproportioned to their capitals, are as likely to have neither wherewithal to buy money, nor credit to borrow it, as prodigals whose expence has been disproportioned to their revenue. Before their projects can be brought to bear, their stock is gone, and their credit with it... When the profits of trade happen to be greater than ordinary, overtrading becomes a general error both among great and small dealers.

Adam Smith 1776 (p. 406).

When prices fall, production is arrested until the expences of production fall in equal degree; and whilst production is thus arrested, consumption is also diminished ... the inducements to employ labour ... are diminished ... and the prices of labour fall. The consumption of labour is thus diminished, and the prices of property again fall, and again act in depressing labour, and in crippling production ... It is the deficiency of money which has occasioned the depression of prices ...

Thomas Attwood 1817 (pp. 99, 101).

We find [the state of trade] subject to various conditions which are periodically returning: it revolves apparently in an established cycle. First we find it in a state of quiescence, — next improvement, — growing confidence, — prosperity, — excitement, — overtrading, — convulsion, — pressure, — stagnation, — distress, — ending again in quiescence.

Lord Overstone 1857 (p. 44).

But though men have the power to purchase they may not choose to use it. For when confidence has been shaken by failures, capital cannot be got to start new

companies or extend old ones ... In short there is little occupation in any of the trades which make Fixed capital ... Other trades, finding a poor market for their goods, produce less; they earn less, and therefore they buy less ... Thus commercial disorganization spreads ... The chief cause of the evil is a want of confidence.

Alfred and Mary Marshall 1881 (pp. 154-55).

1. The Emergence of Business Cycles in History and Economic Thought

1.1 Early Observations and Interpretations

Well before the concept of a business (or trade) cycle originated, serious episodes of commercial and financial instability were repeatedly observed by contemporaries. The four selected quotations above, from Adam Smith 1776 to Alfred Marshall 1881, illustrate the reactions of some of the classical economists and politicians in England. Smith's brief mention of "overtrading" is the only one in The Wealth of Nations.¹ Attwood, a banker and politician, blamed reductions in the money supply under the gold standard for the resulting deflation and interacting declines in spending and incomes (see Link 1958, pp. 6-35; Backhouse 1988, pp. 134-34). The "famous words" of Lord Overstone, who may have been the first to write about a multi-stage "cycle of trade," were cited with approval by Marshall a quarter of century later. The stress on the confidence factor in Marshall of 1881 recalls not only Pigou of 1929 but also Keynes of 1936. There is much in these and other early theories of crises and cycles that deserves to be rediscovered and reconsidered today.²

Because of the predominance of classical tradition, problems of long-term equilibrium constituted the principal concern of the prominent theorists in the nineteenth century and short-term business cycle problems at best a secondary

interest. Yet throughout that century, from Sismondi and Malthus to Marx and Hobson, intense controversies prevailed about the validity of Say's Law that supply creates its own demand and about the possibility of a "general glut" (Sowell 1972). There can be little doubt that this was so largely because of the pressure of events: the need to account for the recurrent "crises," the related decreases in sales and profits, and the increases in unemployment.

A study of monetary statistics for France and England (since 1800) and the United States (since 1836), led Juglar ([1862;1889]) to believe that crises are merely stages in recurrent business cycles. Although the title of his work refers to the "periodic return" of the crises, the durations of his cycles vary considerably.³ According to Juglar, cycles are principally a feature of economies with highly developed commerce and industry, division of labor, external trade, and the use of credit. This idea was accepted and developed further by most of the leading scholars in the field.

The association of business cycles with modern capitalism is reflected in the NBER reference chronologies which begin (for annual dates of peaks and troughs) in 1792, 1834, 1840, 1866 for Great Britain, United States, France, and Germany, respectively.⁴ There is a substantial agreement that wars, poor harvests, and other episodic disturbances played a greater relative role in the preindustrialization era than afterward, and the endogenous cyclical influences a smaller role. The main reason, presumably, is the pronounced cyclicity of investment in "fixed" capital — plant, machinery, and equipment. It was only after the great technological innovations of the latter part of the eighteenth century were adopted that the size of such investment, and its share in output, began to increase rapidly, in England, then Western Europe, and the United States. In earlier times, processing of raw materials by labor must have

represented a much larger part of total production. It is likely, therefore, that fluctuations of trade and inventory investment accounted for most of the overall economic instability prior to the industrial revolution. But these movements tend to be shorter in duration and more random in nature than the fluctuations related to investment in business plant and equipment.⁵

Differences of opinion still persist on when modern business cycles came into being. Schumpeter (1939, vol. 1, chap. 6B) argues that capitalism goes "as far back as the element of credit creation" and that "there must have been also prosperities and depressions of the cyclical type" in the seventeenth and eighteenth centuries.⁶ Indeed, there is a modest amount of evidence on how harvests, grain prices, exports, imports, and sales and profits of a small sample of enterprises changed from year to year in Great Britain between 1720 and 1800. Four economic historians compiled chronologies of commercial crises for this period, which show a fair amount of consensus. There may have been six or eight major contractions of credit, and several more downturns of profit.⁷ The problem is not with the existence of some substantial fluctuations but with their nature. How comparable are they with the later business cycles? Unfortunately, there is no conclusive answer to this question because of severe limitations of the available data.

1.2 Popular Meaning

Unlike a theoretical concept such as that of equilibrium, a business cycle is in the first place an empirical phenomenon founded upon historical experience. People engaged in business and public affairs have long observed that economic conditions are generally satisfactory or good much of the time but weak or bad some of the time. An old term for the good times was "prosperity", an old term

for the bad times was "depression". The transition from the former to the latter used to be called a "crisis" (and occasionally a "recession", but this designation came to be reserved for a mildly depressed period and is so applied presently). The transition from depression to prosperity was called "revival" (today the term "recovery" is more common). It seems fair to say that these broad descriptions soon acquired a rather good intuitive meaning and wide acceptance in use.

The evidence comes from hundreds of official documents and contemporary reports where such characterizations of the prevailing business situations are found over long sequences of years for market economies at various stages of development and industrialization. The terms denote phases of what came later to be called business (in England, trade) cycles, and their context was from the outset an economy with increasing population, labor force, productive capacity, and output. In the nineteenth century, long-term economic growth trends, like the fluctuations around them, became a widely recognized empirical phenomenon. Thus, prosperity soon got to have the connotation of an "expansion" and depression that of a "contraction," although these terms came into use only later and were given a more explicit technical meaning by economists. Depressions were seen clearly as distressful interruptions of growth that was necessary to maintain prosperity. The dynamic nature of the perceived processes is well documented by the qualifiers frequently attached to the descriptions of the state of the economy. For example, a depression might be "mild" or "severe", a revival might be "slow" or "rapid", etc.

Business annals based on a large collection of such materials were compiled by the National Bureau of Economic Research (NBER) as one of its earliest projects (Thorp 1926). They provide comprehensive qualitative records of general

economic changes in a number of countries between 1790 and 1925.⁸ The construction of the historical NBER business cycle chronologies for the United States, Great Britain, France, and Germany was accomplished by a complementary use of the business annals and quantitative information drawn from a large collection of time series on aspects of general economic activity, price indexes, monetary and financial statistics, etc. (Burns and Mitchell 1946). On the whole, a good agreement was found between the dates of the business cycle peaks and troughs suggested by the annals and the dates based on the statistical time series (for evidence, see Mitchell 1927, pp. 20-31).

That many contemporaries were able to diagnose business conditions rather well even in the face of great limitations of public data on the economy, is a remarkable fact, which is a testimony to the persistence and pervasiveness of business cycles. It takes months for downturns and declines to spread through the economy, and much more time yet for their effects to grow and recede. Such developments hurt the well-being of people in many occupations, industries, and regions, hence are generally apprehended by them, although often with lengthy lags and great uncertainty. A similarly extended recognition process applies to economic upturns and rises. Business people track their sales and profits and learn when they are high or low, increasing or decreasing. Workers learn when jobs and wages are easy and when they are hard to get. Consumers know how much money they are able and willing to spend. One would expect sharp turning points and strong, sustained expansions or contractions to be recognized more promptly and reliably than gradual transitions and weak, erratic upward or downward movements.⁹

1.3 Economists' Definitions

It may be easy to recognize some manifestations of a business cycle, particularly the more extreme ones, but the history of events and ideas suggests that it is anything but easy to define what a business cycle actually is.¹⁰ In recording sharp economic fluctuations, contemporaries and historians alike observe in the first place the diverse disturbances, from bad weather to political upheavals and speculative manias and panics, which seem to account for crises and downturns. The concentration on isolated episodes and outside shocks precludes a definition of the entire fluctuation or cycle as an economic phenomenon and analytical target.

In contrast, economic theorists who accept the existence of general economic fluctuations are interested in the concept of "the" business cycle and its main cause or causes. In some cases, the theory appears to rule the definition. For example according to Cassel, "A period of boom is one of special increase in the production of fixed capital; a period of decline or a depression is one in which this production falls below the point it had previously reached... This means that the alternation between periods of boom and slump is fundamentally a variation in the production of fixed capital, but has no direct connection with the rest of production" (see [1923] 1932, pp. 550, 552). Cassel, like Tugan-Baranovskii and Spiethoff before him, believed that changes in cost and value of capital goods are the main force driving the cyclical motion of the economy.

As another example, consider Hawtrey's statement that "The trade cycle is above all a periodical fluctuation in manufacturing activity and in the price level, the two fluctuating together" (1927, p. 471). Hawtrey's theory stressed the role of movements in bank credit, inventory investment, and prices in the relatively regular cycles of the pre-World War I gold standard era.

The search of literature for definitions of business cycles is on the whole frustrating. Most authors do not formulate such definitions by means of identifying empirically the principal "stylized facts" about what happens during expansions, downturns, contractions, and upturns. However, Mitchell proceeded along this way and arrived at a tentative working definition near the end of his 1927 volume (p. 468). With "some modifications suggested by experience in using it," that definition was restated as follows at the beginning of the 1946 volume by Burns and Mitchell (p. 3):

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

The main point here is the comovement of many economic variables or processes, which occurs with a rough synchronism (allowing for leads and lags of mostly moderate length) in the course of any business cycle. What matters is that many diverse activities tend to expand and contract together; also, it should be added, that they evolve over time and cannot be reduced to any single aggregate (Moore and Zarnowitz 1986, p. 737). Hence the question of what precisely constitutes the "aggregate economic activity" is purposely and properly left open. The nature of business cycles depends on, and changes with, the major

characteristics of the economy, society, and polity. The most common and salient feature of business cycles is their pervasiveness and persistence (the high cyclical conformity or coherence of numerous variables and their pronounced serial correlation). It is not the fluctuation of any single aggregate, however important.

In support of this argument, note that in the peacetime cycle before World War II prices as well as quantities of industrial products tended to increase in expansions and decrease in contractions, which implies that nominal values of total output and income would have had larger amplitudes of procyclical movement than the real values. In contrast, in more recent times the overall level of prices continued to increase during contractions, albeit often at a slower pace (lower rates of inflation). Hence, real GNP is now a much more sensitive measure of cyclical changes in "aggregate economic activity" than nominal GNP is—whereas historically the opposite must have often been the case.

Of course, no statistics on GNP in either current or constant dollars were available before World War I, and none appeared on any regular basis in the interwar period. In fact, no single comprehensive measure of aggregate economic activity, with sufficient comparability of coverage and validity of estimation, exists for a long stretch of historical time. This applies to annual data and, still more so, to monthly and quarterly series that are much needed for the study of business cycles (as well as of short-term economic changes in general). It is therefore not only conceptually desirable but also statistically necessary to use a number of indicators rather than any single one. To be sure, they should include the most reliable and comprehensive time-series data that can be had. In practice, for periods before 1914 or 1929, series representing various activities of production, consumption, investment, trade, and finance had to be

collected and used as composite indexes of business activity, along with price indexes and other useful aggregates such as bank clearings and debits.¹¹

The Burns-Mitchell definition refers to a broad range of durations (1 - 12 years), thereby accommodating both short and long cycles. It includes no strict amplitude criterion, but rules out accepting smaller-than-usual movements as cyclical (this is roughly the intended effect of the last clause of the definition; see Burns and Mitchell 1946, pp. 7-8). No distinction between major and minor cycles is made. The definition admits equally vigorous and weak expansions, severe and mild contractions.

1.4 Past Views on the Scope and Nature of Business Cycles

All descriptions and definitions of business cycles are guided in part by some theoretical ideas and in part by some observations and measures of what is going on in the economy. The data available to the early generations of students of the subject were meager indeed. Juglar, in the first large-scale work on the history of commercial crises and cycles (1862), assembled mainly monetary, banking, and price statistics. He showed that discounts and deposits were high in crisis (peak) years, low in liquidation (trough) years, while the reverse was true for bullion reserves. Prices rose before and fell after a crisis. Later, those economists who stressed the cyclical role of business investment in plant and equipment used various proxies such as prices and output of pig iron for production of capital goods and output of coal for total nonagricultural production (Tugan-Baranovskii [1894] 1901; Cassel 1923).

Note that the emphases on some selected factors and data need not imply a view of business cycles as movements that are narrowly defined in spatial or temporal terms. On the scope and nature of the cycles, widely different opinions

have been held by some economists. Referring to "cyclical fluctuations during the period 1870-1914," Cassel stated that they "have no absolute necessity, but are to a great extent caused by factors which represent passing phenomena of economic history, or which may be, if not eliminated, at least to a great extent controlled" (1932, p. 538). In contrast, according to Robertson (1937, p. 171), "In industrial fluctuation we are up against a problem very deep-seated in the nature of capitalist industry — perhaps of all modern industry — perhaps of man himself. I do not believe myself that we can solve it."

Overall, a perusal of the literature leaves a strong impression that most of the principal writers on business cycles recognized the large dimensions and importance of their problem and task. The interdependence of all parts of the economy, which essentially accounts for the wide diffusion of cyclical movements from any initial source, was well understood long before the advent of modern macroeconomic analysis. Indeed, the latter in some ways narrowed the approach to the study of business cycles, making it generally more aggregative and often also less dynamic. The pioneers in this field had a lively appreciation of the importance of endogenous cyclical processes and their connection with long-term economic growth and development. Many later contributions show less scope and vision in these respects. To be sure, the more recent work also displays the major benefits of using much more abundant, comprehensive, and accurate data as well as new techniques and insights of modern stochastic and econometric approaches.¹²

Those scholars who engaged in large-scale empirical research on the subject have been particularly insistent on seeing business cycles as complex phenomena of great importance: not only the main form of economic instability but also the uneven path of economic growth. Thus, to Burns and Mitchell, "The problem of how

business cycles come about is ... inseparable from the problem of how a capitalist economy functions." They were "not content to focus analysis on the fluctuations of one or two great variables, such as production or employment" but "sought to interpret the system of business as a whole ... to penetrate the facade of business aggregates and trace the detailed processes— psychological, institutional, and technological — by which they are fashioned and linked together." ¹³

Similarly, Schumpeter's opening statement in his 1939 treatise that "Analyzing business cycles means neither more nor less than analyzing the economic process of the capitalist era" conveys the sense of a most inclusive conception. Although "economic fluctuations properly so called [are] those economic changes which are inherent in the working of the economic organism itself," the effects of "external factors" or disturbances are also numerous and important; indeed in many instances they "entirely overshadow everything else" (1939, vol. 1, pp. 7 and 12). But Schumpeter has no single definition of a business cycle. Rather, his "really relevant case" is that of interaction of "many simultaneous waves" (*ibid*, p. 212). The scheme involves 3-4, 7-10, and 48-60 year cycles (named after their investigators Kitchin, Juglar, and Kondratieff, respectively; see *ibid*, chap. 5). But there is little support from the data for periodicities in the occurrence of groups of major and minor cycles, although it is certainly true that individual cycles vary greatly in amplitude, duration, and diffusion (Burns and Mitchell 1946, chap. 11; Zarnowitz and Moore 1986, pp. 522-23).

1.5 New Developments and Ideas

Momentous developments bearing on thinking about business cycles occurred

during the 1930s in the worlds of both real events and ideas. The Great Depression was not only an entirely unexpected calamity, it seemed to contradict the established ways and means of economic analysis. Seeking new explanations and remedies, Keynes claimed "to have shown ... what determines the volume of employment at any time" and that therefore "our theory must be capable of explaining the phenomena of the Trade Cycle." Any particular cycle, he believed, "is highly complex and ... every element in our analysis will be required for its complete explanation. But "the essential character of the Trade Cycle and, especially, the regularity of time-sequence and of duration which justifies us in calling it a cycle, is mainly due to the way in which the marginal efficiency of capital fluctuates" (1936, p. 313). Investment depends on the MEC as compared with the rate of interest, which recalls Wicksell's ([1898] 1936) account of the relation between the value and the cost of capital goods, and Fisher's (1907) concept of the "rate of return over cost". But Keynes adds the ex ante discrepancies between investment and saving, the multiplier, and the cycle-induced changes in the liquidity preference and the propensity to consume. He stresses the instability of investment due to sharp fluctuations in business confidence under uncertainty about long-run returns.

Keynes' leading role in the development of macroeconomics of income determination is beyond doubt, but his analysis of business cycles was quite fragmentary and his influence on the subsequent work in this area proved rather limited.¹⁴ Formal models of dynamic disequilibrium based mainly on an interaction of the investment accelerator and the consumption multiplier enjoyed considerable popularity between the late 1930s and the early 1950s (Samuelson 1939; Metzler 1941; Hicks 1950).¹⁵ But it soon became apparent that these models are limited to a mechanical treatment of relations between a few aggregates and

neglect potentially important factors of prices, money, finance, and expectations. A more lasting impact is attributable to the general idea that random shocks and changes in exogenous factors provide impulses that are propagated into cyclical movements by the dynamics of the interdependent market economy. This conception had some earlier origins but was first formalized by Frisch (1933).

Starting in the 1930s, econometric models came into use as vehicles for testing business cycle theories (Tinbergen 1939). Their early postwar versions were heavily influenced by the Frisch impulse-propagation model and the Keynesian I-S model of Hicks (1937). The development of macroeconometric models depended critically on the growth of modern statistics, and particularly the system of national income accounts.

Hansen ([1951] 1964, p. 4) defines the business cycle as "a fluctuation in (1) employment, (2) output, and (3) prices. "Although he refers to Mitchell's 1927 definition, he is content to use only the aggregative measures of output and employment, plus the indexes of consumer and wholesale prices. More recent studies tend to restrict the criteria further to measures of real income and output, dropping the comprehensive price indexes because of their continued rise during the business contraction of the past 30-40 years. Other measures such as those of the diffusion of cyclical movements attract little attention. However, the dates of business cycle peaks and troughs as identified by the NBER continue to be generally accepted.

Views on the nature and scope of business cycles remain disparate. The once prevalent theories of endogenous or self-sustaining cycles have been for some time in retreat, though surviving in various nonlinear macrodynamic models and lately experiencing some resurgence. The predominant type is theories of

cyclical response to various exogenous disturbances. The main controversies concern the source of the originating shocks: Are they real or monetary? To aggregate demand or aggregate supply? Monetarists stress the instability of growth in money supply due to errors in monetary policy. Keynesians stress the instability of private spending on capital goods and consumer durables. Both groups see the main shocks as arising on the demand side, but some new equilibrium theorists give more attention to supply shocks that impact the relative prices of oil and other major inputs, technology, and productivity.

This is no place to discuss in any detail the recent evolution and present state of business cycle theories (for a treatment of this subject, see Zarnowitz 1985, 1991). Only a few remarks are in order here, but more will be made later in the context of a descriptive analysis of past and recent business cycles.

The range of contemporary views is indeed remarkably wide. Some theories predict the recurrence of serious financial crises and business depressions (Minsky 1982). Others see the "cycles" as phenomena of moving equilibrium, no more than adjustments to random shocks (e.g., to technology) and of low social cost (Plosser 1989). Most of the writings can be located somewhere between these extremes.

The debate increasingly concerns the underlying institutional and market conditions. Increases in the weight of the public sector and the role of government actions first resulted in rising beliefs that business cycles can be not only reduced but even entirely eliminated by proper stabilization policies. The focus of such expectations shifted over time from fiscal to monetary policies, and from purely discretionary to more rules-oriented policies. But in the process the high hopes of banning all boom and bust sequences were repeatedly disappointed. The celebrated inflation-unemployment tradeoff has seemed to

vanish altogether in the 1970s, but this was a temporary eclipse reflecting the worsening inflation (actual and expected) and the novel supply shocks (huge oil price jumps). What became clear is that the tradeoff is neither stable nor predictably exploitable for purposes of stabilization policy, but is itself dependent on the varying sources and characteristics of business cycles.

A related issue is the cyclical sensitivity of prices and wages. The new classical economists believe that prices in general are flexible, reacting promptly to clear the markets. The new Keynesian economists believe that industrial prices and wages are sticky, reacting but slowly. In this view, both nominal and real (or relative) rigidities exist, and they are presumed to have good reasons, that is, to be consistent with considerations of self-interest of individuals and more or less organized groups. These reasons, however, are not yet well understood, so the causes of price and wage stickiness are in urgent need of much further research.

1.6 Some Basic Reflections and Further Steps

The preceding sections have shown that the documented history of business cycles goes back at least two hundred years. The popular awareness of recurrent crises and alternations of prosperous and depressed times is reflected in similarly long records. Serious thought about the nature and causes of major economic fluctuations accompanied serious thought about the nature and causes of industrial development and economic growth since the early writings on political economy.

If this is so, should it then not be clear by now what a business cycle is? Why the need to raise this question time and again? The reason is that business cycles are changing as well as complex. A process that repeats itself with

substantial regularity over long periods of time will not withhold its secrets from inquiring minds over many decades of intensive study, even if it were quite complicated. But business cycles involve many interacting processes (economic, political, and broadly social) whose roles vary and evolve. They are most probably caused in part by uncontrollable outside disturbances and in part by errors of public policy and private decision makers that may be avoidable; but they are also, just as plausibly, to a large extent self-sustained and self-evolving. They are certainly not the same at all times and in all developed market economies, although they show a great deal of international interdependence.

To improve our understanding of business cycles, it is necessary to learn from their past as well as present, and to study both their common features and diversity, continuity and change. In what follows, I shall consider the main lessons from the chronologies of business cycles in the United States and abroad, and from research on the indicators and measures of cyclical and related processes. This will include examples of stable and changing behavior, and of some international similarities and differences.

2. The Changing Dimensions of Business Cycles

2.1 The Historical Reference Cycle Chronologies of the NBER

Annual chronologies of "reference cycles," that is, business cycle peaks and troughs, as estimated by Burns and Mitchell (1946) from time series studies and Thorp's annals, are available for the United States and Great Britain between 1790 and 1858. Monthly (as well as quarterly and annual) reference chronologies from the same source cover the U.S. and Britain for 1854-1938, France for 1865-1938, and Germany for 1879-1932. Table 1 sums up the record of

durations of business expansions, contractions, and full cycles as derived from these dates. Part A lists the means and standard deviations for the overall periods covered and consecutive segments of 3-6 (mostly 4 and 5) cycles each. Part B lists the shortest (S) and the longest (L) durations over the same periods and somewhat fewer successive subperiods

It is clear that the durations have varied greatly, as shown by the huge S-L ranges in part B. For example, the U.S. expansions ranged from 10 to 72 months, contractions from 8 to 72 months, full cycles from 24 to 108 months (trough-to-trough) or 17 to 101 months (peak-to-peak). The results for the other countries are very similar: slightly larger S-L differences still for the British cycles, slightly smaller for the shorter histories of the French and German cycles.

However, these are comparisons between outliers, which can greatly overstate the more common differences between the duration measures. Indeed, U.S. business expansions in peacetime averaged 22-26 months in each of the four segments of 1854-1938 and 25 months in the period as a whole.¹⁶ Remarkably, the corresponding contractions were not much shorter, averaging 19-20 months in three segments, 27 months in one, and 21 months over the total period 1854-1938. Expansions varied relatively much less than contractions, as shown by the standard deviations attached to these averages. For full cycles, most of the mean durations are close to four years, with overall standard deviations of 18-20 months. These statistics disclose no systematic changes in phase and cycle durations. They surely justify the phrase "recurrent but not periodic" in the NBER definition. Still, the central tendency of the duration figures suggests a modest degree of regularity. Thus, 15 of the 19 peacetime expansions of 1854-1938 (79%) fall into the range of 1 1/2 to 2 1/2 years, and the same proportion applies to contractions in the range of 1 to 2 years.

The cycles in the other countries show more variability in durations both across and within subperiods. The U.S. cycles tended to be more numerous and shorter.¹⁷ They numbered 21 in 1854-38, averaging 4 years, while the British cycles numbered 16 and averaged 5 1/3 years. For the longest common period, 1879-1938, the comparison is as follows:

	United States	Great Britain	France	Germany
Number of cycles (T to T)	17	13	14	10
Mean duration (months)	48	65	53	64
Standard deviation (months)	18	31	25	24

Figure 1 compares by means of a schematic diagram the timing of business cycle peaks and troughs in the four countries. It suggests a fairly high degree of correspondence between the chronologies. Of the total of 146 turning points shown, 92 (63%) match for all four countries and another 36 (25%) for three countries. Four turning points can be matched for two countries and only 14 (10%) are unmatched. Practically the same proportions apply to peaks and troughs taken separately.

When examined more closely, Figure 1 shows that during the first quarter-century covered French and German cycles diverged considerably, probably in part because of annual dating. The U.S. cycles conformed better to the British and German than to the French cycles. In the period 1879-1914 — the heyday of the pre-World War I gold standard — the conformity between the business cycles in the European countries was particularly close, but the U.S. economy followed a different pattern of shorter and more frequent fluctuations. The timing of the

wartime expansions (1914-18) and contractions (1918-19) was very similar in all four countries. In the 1920s and 1930s, the European economies were much less in phase with each other than in the preceding forty years, but the degree of conformity between their cycles and those in the United States increased (see Morgenstern 1959, chap. 2).¹⁸

2.2 A Cautionary Note

The limitations of data, particularly for the early times, might have produced various errors in the identification of the reference cycles. A particularly likely type of error is that of mistaking a serious slowdown (phase of a low, i.e., below-trend but still mainly positive, growth) for a contraction (phase of an absolute decline in the overall economic activity). One reason to suspect this is that the reference contractions are so much longer and more frequent in the pre-World War II era than for the more recent times about which there is much better and more complete statistical information (see the next section). Another reason is that business annals and indexes representing deviations from "normal" business conditions (where the "normal" levels or trends themselves are not quantified) were extensively used in determining the U.S. reference dates for the period before 1873, and these sources may be especially susceptible to the suspected bias (Zarnowitz 1981, pp. 494-99).

A reassessment of the evidence must take into account that the historical contractions may represent declines in real or nominal aggregates or both, depending on the strength and persistence of the concurrent movements in the general price level. Deflations greatly aggravated some past depressions, and wholesale price indexes are among the oldest important cyclical indicators. Both real and nominal representative time series must therefore be carefully

considered, and when this is done the NBER chronology is found to be in good overall agreement with dating by other economic historians and generally well supported by the available evidence (Burns and Mitchell 1946, pp. 107-13; Zarnowitz 1981, pp. 494-505; Moore and Zarnowitz 1986, pp. 755-64).

This does not mean, however, that all the identified cycles (let alone their precise dates) are equally well confirmed. A few episodes are doubtful. They include four NBER contractions: 1845-46, 1869-70, 1887-88, and 1899-1900, of which the first one is most uncertain. (The last three have their peaks and troughs marked ? in figure 1.) The information on hand seems to me insufficient to make a conclusive determination of whether these were periods of actual declines or retardations below average growth. There are some problems with a few other minor contractions as well but they are easier to resolve (Zarnowitz 1981).

If the episodes listed above were treated as slowdowns instead of contractions, the average durations of expansion (\bar{E}) would be considerably increased, both absolutely and relative to those of contractions (\bar{C}). The following tabulation shows this for the two principally affected periods.¹⁹

	<u>1834 - 55</u>		<u>1854- 1919</u>	
Number of cycles (T to T)	5	4	16	13
Expansion, months (\bar{E})	26	36	27	37
Contraction, months (\bar{C})	24	27	22	23
Ratio, \bar{E}/\bar{C}	1.1	1.3	1.2	1.6

Some of the reference dates for the other countries may also be questioned.

Burns and Mitchell (1946, p. 113) mention explicitly the German 1903-05 contraction²⁰ and France "after 1932." Consequently, question marks are attached in figure 1 to the former case and the French contraction of 1933-35 (as well as to three pairs of U.S. turning points as already noted). In addition, the authors of the NBER dating methodology warn that "The chronology for France in the 1860s and 1870s requires careful consideration" (*ibid*). It is therefore possible that some of the several discrepancies between the French and the other turning-point dates in this period are spurious (but, for lack of more specific information, these dates are left unquestioned in the diagram).

Figure 1 indicates that elimination of such dubious phases as U.S. 1887-88 and France 1933-35 would clearly improve the inter-country correlation of cyclical movements. But in other cases the opposite effects are suggested: note U.S. 1899-1900²¹ and Germany 1903-05. Treating the U.S. 1869-70 period as one of a slowdown rather than contraction would improve the conformity with Great Britain but worsen the conformities with Germany and France (the dates for which, however, are themselves uncertain).

2.3 The Last Half-Century: Long Expansions, Short Contractions

The NBER chronology identifies 15 business cycles measured from peak to peak in 1857-1918; that is, on average one every four year. In 1918-45 there were six cycles with a mean duration of about 4 1/2 years. Between 1945 and 1990 nine cycles occurred, averaging approximately five years. Consequently, according to these estimates (see Table 2, lines 7-9), the length of U.S. business cycles increased and their frequency diminished gradually. However, these differences are small and they could be due largely to errors in a few early reference dates.²² The predominant feature of the average full-cycle

durations, when compared across such long eras, is their relatively high degree of stability.

What table 2 definitely demonstrates is that business expansions tended to be much longer, and contractions much shorter after World War II than before. In the period 1854-1919, expansions averaged 27 months and contractions 22 months; for 1919-45, the mean durations of the respective phases are 35 and 18 months; and for 1945-90 they are 50 and 11 months. Excluding wartime episodes would make the averages slightly smaller for expansions and slightly larger for contractions, but it would not alter significantly the changes between the periods.

Even allowing for the largest plausible errors in the early dating would still leave a large contrast between the pre-1945 and post-1945 cycles with respect to their relative divisions by phase. Thus the \bar{E}/\bar{C} ratio for 1854-1919 can be estimated at 1.2-1.6 (see tabulation on page 21 above). The \bar{E}/\bar{C} ratio for 1919-38 is 1.9, that for 1945-90 is 4.5 (based on the entries in lines 8 and 9). In other words, in the last 50 years the economy has been in expansion phases about 80 percent of the time; before then, perhaps only 55-60 percent of the time.

Business expansions have become not only longer but also more variable, hence less predictable with regard to their durations. The standard deviations of the latter, in months, increased from 10 before 1918 to 26 in 1919-45 and 31 in 1945-90. The range of peacetime expansions was 10 to 50 months before 1945 and 12 to 92 months thereafter (the longest wartime expansions lasted 80 months in 1938-45 and 106 months in 1961-69; see lines 7-14, columns 3 and 4).

In contrast, business contractions have become not only shorter but also more uniform in length, hence in this sense more predictable. Their standard

deviations, in months, dropped from 13 and 14 in 1857-1919 and 1920-45, respectively, to 4 in 1945-82. The range of peacetime contractions was 8 to 65 months before 1945 and 6 to 16 months thereafter (see lines 7-14, columns 5 and 6).

Both expansions and contractions, and hence full cycles, increased in length and variability between the early part of the recent era (the 1940s and 1950s) and the later part (the 1960s, 1970s, and 1980s). This is true for both peacetime and all cycles, as shown in some detail in table 2, lines 1-6.

2.4 Phase Durations in Eras of Inflationary and Deflationary Trends

Through the great contraction of the early 1930s, prices in the United States and Europe followed alternating upward and downward trends (Table 3). This is best seen in the wholesale or producer price indexes, which also have the longest records, but even the less flexible consumer prices show an alternation of periods of inflation and deflation. The complete upswings in wholesale prices lasted generally between 20 and 30 years, the downswings varied more, from 9 to 32 years. Over long stretches of time, the deflations nearly offset the inflations, even when the war periods are included, so that the level of wholesale prices at the bottom of the depression in 1932 was not much higher than in the early times of the Republic, more than 140 years earlier. However, no significant deflationary trends appeared in the nearly 60 years since, only brief price declines in the recessions of 1937-38 and 1948-49. Ours is the age of the most persistent and pervasive inflation on record.

The long-period averages in table 3, column 2, are instructive, even though they conceal much variability over shorter time intervals. Before 1950, comprehensive price indexes had generally, in addition to the longer trends,

clear procyclical movements, up in expansions and down in contractions. Thereafter, disinflation replaced deflation as a frequent concomitant of business recessions and some major slowdowns. Inflation became a grave and stubborn problem primarily because the deflationary slumps have disappeared, not because the booms have grown more inflationary. This is a very important but relatively neglected point.

Periods of rising trends in prices witnessed relatively long business expansions and relatively short contractions, whereas periods of declining trends in prices witnessed the opposite. This was observed as early as 1926 by Mitchell (in his introductory chapter to Thorp 1926, pp. 65-66) and confirmed by Burns and Mitchell in 1946 (pp. 437-38, 538). Table 3 provides a summary of their findings and of the generally consistent later results (see also Moore 1983, chap. 15, and Zarnowitz and Moore 1986, pp. 525-31). In times of rising prices, the expansion-contraction duration ratios \bar{E}/\bar{C} averaged 2.1-2.5; in times of falling prices, \bar{E}/\bar{C} averaged 0.8-1.0. These are large and systematic differences based on U.S. data for 1789-1990 and on European data for periods beginning 1854-95 and ending in the 1930s. The documented relationship is robust: it does not depend on the inclusion of the highly inflationary wartime expansions, for example, or on our use of average rather than total phase durations.²³

The longest and most severe contractions in the history of U.S. business cycles were associated with major deflations, including 1873-79, 1882-85, 1895-97, 1920-21, and 1929-33. This last world depression was ascribed by Irving Fisher (1932, 1933) mainly to "debt-deflation," that is, an overexpansion of debts in the preceding expansion followed directly by sharp downturns in prices and profits.²⁴ Similar ideas on the role of overindebtedness, credit restrictions, and liquidation reappear in some recent theories that also stress the instability

of real investment along the lines of Keynes and are adapted to the present environment of large government and persistent inflation (as in Minsky 1982). But one does not need to accept all these ideas to agree that the avoidance of major deflations helped the postwar economies greatly to avoid major depressions as well. Many monetarists and Keynesians alike would probably accept this statement.

Let it be made immediately clear that to argue against deflation does not mean at all to argue for inflation. Recent experiences with high inflation in developing countries and with stagflation in North America and Europe leave no doubt that any long and sizable inflation is harmful to both real growth and economic stability. Once allowed to develop, inflation, like deflation, is difficult to control and can be self-accelerating by generating perfectly reasonable expectations about its own future. But it is also true that a small rate of inflation really amounts to the desired state of stability in the general price level, given the inevitable technical limitations of price-index measurement. Further, expansions favor price raises, while contractions favor cost and price cuts.²⁵

2.5 Some Other Analytical Uses of the Duration Data

Are business expansions, contractions, and full cycles more likely to end or less likely to end as they grow older, that is, do they exhibit a positive or a negative duration dependence? Diebold and Rudebusch (1990, 1991) attempt to answer this question by fitting hazard functions to the NBER duration data.²⁶ Using an exponential-quadratic hazard model, which is relatively flexible yet parsimonious, they find evidence of a positive duration dependence for pre-World War II business expansions in the United States, Great Britain, France, and

Germany. Thus, the longer these expansions lasted beyond their minimum durations, the more likely they were to end. On the other hand, the pre-1940 business contractions show no duration dependence at all in any of the four countries. For full cycles (both T-to-T and P-to-P) there is evidence of some positive duration dependence but less than for expansions.

These results are definitely associated with the findings reported earlier in part 2 of this paper: prewar expansions and postwar contractions have both stable average durations and positive duration dependence, prewar contractions and postwar expansions have neither. These tendencies are of great interest but difficult to explain. They are not consistent with models of purely random "Monte Carlo" fluctuations that would show no systematic duration dependence for either upward or downward movements. They are also not consistent with models that would produce positive duration dependencies in both expansions and contractions.

It is important to note that a strong periodicity of expansions implies that business cycle peaks should be in large measure predictable. But they are not: even the best reputed professionals seldom make good forecasts of an approaching downturn, and the public often recognizes a recession tardily, with a surprise. Moreover, if the timing of economic downturns were predictable, strong efforts would probably be made to prevent them, or at least to diminish them greatly, so as to avoid the large individual losses and social distress caused by business contractions. If such efforts fully succeeded, business cycles as they are known now would no longer be with us. If they were repeatedly frustrated, we would try to learn why. In any event, the experiment remains only a mental one; were it actually performed, the working of the economy itself could well be significantly altered. The upshot of the argument is simply that strong

periodicities of expansion are not to be expected. This is quite consistent with indications of a significant positive duration dependence in pre-World War II expansions.

For contractions, stable durations have different implications and are not so difficult to imagine. That contractions have become much shorter in the postwar age can be explained in part by changes in the structure of the economy and in part by the direct and indirect effects of much increased efforts of government policymakers to combat recessions and unemployment. The experience of more persistent growth helped to generate expectations that a recession, once known to be under way, will prove to be over soon. A business recovery in the near future is always a highly welcome event (worries about an inflationary boom can wait), and forecasts of a recurrence of such an event are always popular and apt to spread.

2.6 On Theories and Evidence Relating to Periodic Business Fluctuations

The duration data based on the reference cycle chronologies give no encouragement to any theories that imply strong phase and cycle periodicities, but they do not exclude the possibility of some weak and latent periodicities.²⁷ The class of strongly periodic theories includes the early deterministic versions of multiplier-accelerator interaction and nonlinear limit cycles (Samuelson 1939; Kaldor 1940; Metzler 1947; Hicks 1950; Goodwin 1951). Adding shocks can relax the periodicities of the cycles generated by these models. Adding relations involving money, finance, and expectations can enrich and diversify the models. However, none of these refinements are likely to produce any systematic asymmetries and shifts in phase durations.

Nor is it probable that the answer lies in any single impulse or

propagation mechanism. The models of "forced oscillations" driven by factors that are themselves periodic are the simplest and also the easiest to dismiss. The oldest example here is that of weather and harvest cycles that used to be attributed to variations in sunspots or other extraterrestrial influences (Jevons 1884; Henry Moore 1914). There is no doubt that changes in weather can and do cause major and recurrent fluctuations of production, prices, wealth, and welfare in poor agricultural countries. Some of these may be strongly or weekly periodic and are occasionally very large.²⁸ But today the weather and other "seasonal" hypotheses have hardly any plausibility as the explanation of business cycles in the modern industrialized countries (including their farm sectors).

A more timely and currently much debated hypothesis is that of a "political business cycle" linked to the electoral cycle in democratic countries. Here, too, there are elements of forced oscillations, though not ordained by nature but due to events with a calendar rhythm imposed by a nation's laws and institutions. That economics and politics interact in various ways is important and widely acknowledged. But the notion of a regular political business cycle encounters serious theoretical problems, being based on assumptions that would enable the government to pursue a purely self-interested and myopic but highly effective fine-tuning policy. Not surprisingly, good evidence in support of this hypothesis is hard to find.²⁹

Cycles with a positive duration dependence, and indeed a substantial degree of periodicity can be produced by damped linear models with small and dense white-noise shocks and the required structural properties. This hypothesis, in the form developed by Frisch (1933), has strongly influenced the theory and, particularly, the econometric modeling of business cycles. It belongs to a class of models of "free oscillations", which explain the cycles by the way the

economic system responds to the forces that impinge upon it, not by the cyclicity of these forces. This is a useful approach when given a sufficiently broad interpretation. But the empirical validity of models with purely random shocks was never adequately demonstrated. Indeed, the conclusion from simulation studies that used macroeconometric models driven by such shocks only is that the so generated movements lack the dimensions and properties observed in the actual data on business cycles (Hickman 1972).

One of the needed extensions is to large shocks, which contribute to macroeconomic instability along with the small ones (Blanchard and Watson 1986). Large shocks presumptively occur at irregular intervals but are often serially correlated: think of wars, shifts in policy, embargoes, price-level disturbances, speculative waves, financial crises, major bankruptcies and strikes. In general such events and their direct and indirect effects are likely to increase the diversification and irregularity of business cycles over time.

2.7 The Moderation of U.S. Business Cycles

Business contractions in the United States have become not only much shorter but also much milder in the post-World War II era compared with earlier times. Severe depressions like those of the 1870s, 1880s, and 1930s appear to have disappeared for good. Table 4 compares measures of depth and diffusion for the five contractions of 1920-38 and the eight contractions of 1948-82. The former set includes two major depressions (1920-21 and 1937-38), one disastrous depression (1929-33), one mild recession (1926-27), and one more severe recession (1923-24). The latter set includes three mild recessions (1960-61, 1969-70, and 1980) and five more severe recessions (1948-49, 1953-54, 1957-58, 1973-75, and 1981-82). The presently available, complete data indicate that the U.S. recession of 1990-91 (not covered here) will qualify as another mild one.

Table 4 leaves no doubt at all about the relative shallowness of even the most severe of the recent recessions (1973-75 and 1981-82), which contrasts sharply with the depth of either of the two interwar depressions, let alone that of the 1929-33 collapse. Despite the upward trend in joblessness during the recent period, the maximum unemployment rate in the early 1980s was still less than half the level of the rates reached in the 1930s (column 5). Consistent evidence is also provided by diffusion measures, although here the differences are less striking, with the proportions of industries with declining employment ranging from 71% to 100% (column 7).

For the pre-World War I period, comprehensive estimates of economic activity are scarce and their quality leaves much to be desired. Quarterly data used in table 5, lines 1-3, suggest that output was 1½ times more volatile in 1919-45 than in 1875-1918 and twice as volatile in 1919-45 as in 1946-83 (column 3).³⁰ Although the pre-1919 figure may be an overestimate (Romer 1986), there is little doubt about the ranking of the three periods in terms of both quarter-to-quarter and cyclical variability. In percentage terms and on average, the trough-to-peak increases were the largest in 1919-45 and somewhat larger after 1945 than before 1919 (column 6). The peak-to-trough decreases were very large in 1919-45, much smaller in 1875-1918, and the smallest by far in 1946-83 (column 9).

Before 1945, wholesale prices tended to rise in expansions and fall in contractions, as shown clearly in table 5 (see lines 4-6, columns 6 and 9). The trend in prices was just moderately up in 1875-1918 and mildly down in 1919-45, despite the big inflations of World Wars I and II, but it was strongly up in 1946-83 (column 2).

Even though economic growth decreased and cyclical instability increased

in the latter part of the postwar era (since the early 1970s), business cycles remained moderate in comparison to the pre-World War I and, a fortiori, the interwar periods. In other major countries with higher growth rates, business contractions became much less frequent and much milder still (see part 3 below). Several not mutually exclusive hypotheses may explain the observed reduction of the business cycles in the United States. I can only list them briefly here (Zarnowitz [1989] 1991 offers an extended discussion).

1. Employment in service-producing industries and government, which is only weakly procyclical or acyclical, increased greatly relative to employment in goods-producing industries, which is strongly procyclical.
2. Fiscal automatic stabilizers relating to the procyclical income taxes and countercyclical transfer payments, became quite effective, particularly before the rise in inflation and its distortionary tax effects.
3. Federal deposit insurance prevented general banking panics, although lately at high cost to the taxpayers.
4. The rates of change in money supply were more volatile in 1875-1917 and, particularly, 1919-39 than after 1946.
5. The record of discretionary fiscal and monetary policies, although quite mixed over time, was on balance sufficiently positive to help avert depressions and persistence of high unemployment.
6. The gradual recognition that business contractions have become shorter and milder strengthened the confidence of businesspeople, workers, and consumers and made them adopt behavior promoting growth (but this was partially offset in more recent times by the

expectational effects of rises in inflation and unemployment).

3. Some International Comparisons of Cyclical Movements and Growth Trends

3.1 The Major Market Economies After World War II

World War II devastated the economies of Continental Europe and the Far East. The physical wealth and capital of once rich nations — cities, factories, machinery — lay in ruins and in dire need of reconstruction. But human capital was much better preserved, that is, people retained their high productive potential — education, skills — and the backlog of effective demand was huge. Monetary, fiscal, and political reforms enabled both the defeated nations and the nations liberated by the Allies to make a relatively smooth transition from closed war economies to open market economies, and from totalitarian and oppressive to democratic and free social systems. Foreign aid, mainly from the United States, was also made available to friend and former foe alike.

The result of this historically rare, perhaps unique, combination of circumstances was that France, Italy, West Germany, and Japan (as well as a number of smaller countries) came soon to enjoy extraordinarily high rates of real economic growth. Of course, the initial activity levels were very low, which helps explain the long persistence of very high and only gradually declining growth rates, but anyway the progress achieved in the 1950s and 1960s was spectacular, particularly in the case of West Germany and Japan.

As long as the steep upward trends in employment and output (much of it exported) continued, real growth in continental Europe and the Far East was interrupted infrequently and mostly by slowdowns rather than absolute declines in overall economic activity. Thus, the benefits of high growth were augmented by those of high cyclical stability.

Figure 2 presents the evidence. The data, collected and processed by the Center for International Business Cycle Research (CIBCR) at Columbia University Business School, are composite indexes of coincident indicators, which combine monthly and quarterly measures of aggregate activity (total output, industrial production, employment, real sales, inverted unemployment) and have trends made equal to those of the corresponding series for real GNP or GDP. Note that West Germany had its first postwar recession in 3/1966-5/1967, Japan (for which the index begins in 1954) in 11/1973-2/1975 (see figure 2A). For France (since 1955), the first postwar contraction shown is in 4/1958-4/1959, for Italy it is in 10/1963-3/1965 (figure 2B). Meanwhile, Canada and the United Kingdom (figure 2C), and the United States and Australia (figure 2D), all countries that suffered much smaller direct wartime damages, had less need of domestic reconstruction, slower growth rates, and earlier and more frequent recessions.

Economic growth slowed markedly everywhere during the 1970s and 1980s, and recessions became both more common and more severe. They spread worldwide in 1947-75 after the oil embargo and huge increases in the OPEC cartel oil prices, and again in 1980-82 after new price shocks and strong counterinflationary policy moves in the United States. However, the index for Japan shows only a brief decline in late 1980; its growth after the mid-1970s was much slower than before but also remarkably steady. The index for France shows frequent but only short and shallow declines throughout, except in 1958-59 and 1974-75 (its sharp decline in the spring of 1968 reflects largely the concurrent political unrest).

3.2 Estimated Dimensions of Business Cycles in Eight Countries

There is no NBER-type international reference chronology of business cycle peaks and troughs for the post-World War II period. Perhaps the main reason for

this is the belief that recessions have been generally replaced by mere retardations of growth in most countries. But this is a vague view or expectation, not a well-established fact. What is certainly true is that contractions of total output and employment have been short, few and far between in developed and developing countries that achieved high average rates of real growth.

The laborious and data-intensive task of identifying and dating business cycles in different economies cannot be attempted here. However, much can be learned from the rich data bank of CIBCR, and particularly their coincident indexes, covered in figure 2.

The black dots in figure 2 mark peaks and troughs of specific cycles in the indexes. The so identified declines last several (as a rule, six or more) months and have amplitudes of several or more percentage points (as a rule, at least 1%). They presumably reflect business contractions. The open dots mark shorter and/or smaller declines that do not qualify as recessions but may be associated with significant retardations in general economic activity. However, substantial business slowdowns can occur without any noticeable decreases in the levels of the index series, particularly in places and times of very high overall growth (see, e.g., West Germany, 1956-57, and Japan, 1957 and 1964).

The charts show some important similarities between the country indexes, notably the concentration of long expansions in the 1960s and 1980s, of mild recessions or slowdowns in mid- or later 1960s, and of more severe contractions in mid-1970s and early 1980s. But the differences are even more pronounced, and it is clear that they are primarily related to the longer growth trends. The main point here is that high growth helps to reduce the frequency and depth of business contractions.

Thus, periods of rapid and recession-free growth are observed for West Germany and Italy before 1962; for France in most of the 1960s and again after 1985; for Japan before 1973; for Canada between 1961 and 1981; and for Australia between 1961 and 1973. The economies of the United States and United Kingdom had relatively low rates of real growth and most cyclical variability. In sharp contrast, Japan had both the fastest growth and least cyclicity; indeed, one can say that business cycles as we know it were essentially absent there.³¹

Figure 2 suggests that the postwar business cycles were shorter and more numerous in the United States than in any other of the seven countries. In 1955-90, the longest common period covered, the numbers of complete peak-to-peak cycles in the indexes were as follows: United States, 6; United Kingdom and Italy, 5 each; France and Australia, 4 each; Canada and West Germany, 3 each; and Japan, 2. Comparisons between fewer countries over longer periods yield generally consistent results. Further, inspection of the charts suggests that the greater frequency of U.S. cycles was mainly due to the shorter durations of U.S. expansions. On the whole, it was the expansions that differed greatly across the countries in both length and amplitude, whereas the contractions varied much less in both dimensions.

Table 6 presents a summary based on the data plotted and the specific-cycle turning points identified in figure 2. It demonstrates that the cyclical rises in the U.S. index were on average much shorter than the rises in the foreign indexes (column 6), and also much smaller in percentage terms than the indexes for the other countries, with the sole exception of the United Kingdom (column 7). As for the cyclical declines in the U.S. index, they were on average considerably deeper than the declines in the other indexes, but not particularly long (columns 9 and 10). The entries on mean durations and mean amplitudes

quantify the impression from the charts that expansions differed greatly across the countries (even apart from the extreme cases of West Germany and Japan), while contractions differed only moderately.³²

A comprehensive assessment of how business cycles in the different countries compare would require an analysis of the performance of many individual indicators, which is not possible here. However, I examined the industrial production and employment components of the coincident indexes under consideration, and find that a few general observations deserve to be made. The industrial production indexes cover sectors of high cyclical sensitivity (manufacturing everywhere, mining and/or public utilities in most countries).³³ Therefore they have at least as many specific cycles as the coincident indexes (which cover less sensitive sectors and processes as well), often significantly more. Thus, the industrial production series for Japan (mining and manufacturing) shows clearly seven expansions and six contractions in the period 1953-90.

In the United States, although nonfarm employment has a much broader coverage than industrial production, the cyclical profiles of the two indicators are quite similar. This is definitely not the case in some of the other countries, however. In Japan, total employment of "regular workers" had only one cyclical contraction (4/1975-5/1976) between 1954 and 1990.³⁴ In the United Kingdom, employment in production industries followed a gradual downward trend since 1966, and the same applies to West German employment in manufacturing and mining from 1971 until mid-1984 as well as to French nonfarm employment between mid-1974 and mid-1985. This stands in contrast to the United States, where an upward trend in employment prevailed throughout. It is well known that, after having stayed very low in the earlier postwar years, unemployment in Western

Europe increased rapidly (quadrupled) between 1970 and 1985, from well below to well above the U.S. levels. Yet, despite the downtrends in employment and clear cyclical movements around them, business cycles apparently remained milder in Europe than here. This suggests that the persistent rise in European unemployment was largely noncyclical in nature, which is consistent with most recent hypotheses.³⁵

3.3 Possible Reasons for the Observed Differences

There are no tested hypotheses, let alone accepted knowledge, on why the U.S. economy may be subject to more frequent and deeper recessions than Japan, West Germany or France. However, there is much debate about the sources of differences in longer-term growth rates between the major industrial and trading countries. Insights from this literature bear on the present problem insofar as higher growth is in fact conducive to greater cyclical stability.

The central argument here is simple. Investment in human and physical capital produces advances in knowledge, technological progress, and increased rates of growth in factor productivity, output, and real income. What is desired, therefore, is higher maintained rates (and shares in total output) of saving-cum-investment in real terms.³⁶ There is no need here to cite the voluminous theoretical and empirical work on sources of economic growth, which generally supports this basic position. As a practical outcome, there is considerable consensus that the most successful economies are those that have the highest average long-term rates of capital investment. The United States had for some time now relatively low shares of private saving and total productive investment, hence it is widely and variously urged to perform better in this respect, as its main competitors in Europe and the Far East do.

On the other hand, fluctuations in business and consumer capital outlays have long been recognized to be a major source of cyclical instability in aggregate demand. The above argument seems to ignore or assume away the problem. Since investment is much more cyclical than consumption, is it not necessarily true that a larger share of investment will increase the fluctuations of the economy, along with its growth?

The short answer is no. Investment can be both high and stable, provided it is a part of, and a response to, growth in aggregate demand that is sufficient to keep the economy near full employment. As the classical long-run version of the accelerator theory has it, net investment is in the end only justified by growth in the demand for the product of the new capital (which ought to be given the broadest interpretation). But, as noted before, it is equally true that growth itself depends positively on prior rates of investment. Increases in real capital, physical and human, generate improvements in productivity that can reduce costs and prices. This is particularly important in the competitive world of open economies.

In sum, higher rates of saving, investment, and growth can coexist with, and indeed may favor, greater cyclical stability. The problem is how to maintain them. But several heavily export-oriented countries in Europe and Asia did very well on this score, and their experiences may hold useful lessons.

The other side of the argument that more growth promotes more stability is that economic fluctuations can have costly long-term consequences in the form of suboptimal investment and growth. In a recent model, firms must make technology commitments in advance, and unanticipated volatility causes errors in these decisions (e.g., on the scale of a new plant or size of the work force) which have substantial negative output effects (Ramey and Ramey 1991).³⁷

To be sure, there are other factors to be considered. Business cycles have historically been more frequent and shorter in the United States than in Europe, as shown above in section 2.1 (table 1 and text). This difference points in the same direction as that observed in recent times, but it is much weaker and there are no large and systematic disparities in country growth trends to account for it. To my knowledge, it was never explained. Possible reasons include a larger role of short inventory fluctuations in the United States and more frequent financial disturbances.

3.4 Growth Cycles

In countries where growth persisted at high rates and business contractions occurred rarely and remained mild for a considerable time, even mere slowdowns cause much public concern and indeed are often treated as actual recessions are treated elsewhere. This is so because the slowdowns are themselves of significant duration, result in some rise in unemployment and weak business conditions generally, and are usually associated with absolute declines in some more cyclically sensitive activities and sectors. In the 1960s, when confidence about the long-lasting era of high growth and rising prosperity reached its peak, business cycles seemed increasingly "obsolete" and interest shifted to "growth cycles," that is, fluctuations around the upward trend in a nation's economic activity expressed in real terms (Bronfenbrenner 1969; Mintz 1969, 1974).

The concept of growth cycles is an old one, as illustrated by the fact that early indexes of general business conditions and trade were more often than not available only in form of percentage deviations from estimated trend or "normal" curves (see Zarnowitz 1981 for a brief history of this approach and references). Implicitly, the idea of growth cycles has also long been popular with textbook authors who refer vaguely to business cycles being "fluctuations around the

trend" and stress the transitory nature of departures of the actual from the potential (full employment) output. But it is very important to distinguish clearly between business cycles and growth cycles because the two differ qualitatively and not just in degree. A slow expansion is still an expansion; the problems posed by a contraction are quite distinct. Moreover, trends interact with cycles, vary over time, and are difficult to isolate and measure.

In spite of these difficulties, much interesting work has been done in the last twenty years on the postwar growth cycles in many countries, particularly by Mintz at the NBER and by Moore and his associates at the CIBCR.³⁸ When cautiously interpreted, the results can yield lessons on when and how expansions speed and slow, and retardations do or do not develop into contractions.

The chronology of growth cycles is derived from the observed consensus of the corresponding turning points in series of deviations from trend just as the chronology of business cycles is derived from the consensus of turning points in series of levels. In both cases, the same basic set of data is used, namely a country's principal coincident indicators - the main comprehensive measures of GNP or GDP, personal income, sales, employment, and industrial production (all deflated or in physical units). In both cases, too, peaks and troughs mark specific cycles in the indicators used (whether they relate to the original levels or those in the trend-adjusted series). The trends should be flexible and as free of any cyclical components as possible (in the CIBCR studies they are determined by interpolation between segments of the series determined with the help of selected long-term moving averages).

This paper is mainly concerned with business cycles, not growth cycles, but a brief review of how the two units of observation are related is in order. Figure 3 presents in schematic form the timing of growth cycle peaks and troughs

in six countries. The initial and terminal dates of slowdowns that ended in renewed expansions are marked by ordinary dots, the dates of slowdowns that ended in contractions are marked by heavier black dots. The count below indicates that slowdowns-without-recession prevailed strongly in Japan, less so in West Germany

	U.S.	Canada	U.K.	West Germany	France	Japan
Slowdown, no recession	4	7	3	5	3	6
Slowdown and recession	7	5	5	3	4	2

and Canada, while slowdowns-with-recession were more common in the other three countries, most notably the United States.³⁹ Growth cycles include both types of slowdown, hence are much more numerous than business cycles that are defined by the presence of absolute decreases in aggregate activity (recessions). In the trend-adjusted indicator series, all major retardations are reflected in specific-cycle declines that make up growth-cycle contractions; some of these movements descend into the negative region, others stop short of it.

Slowdowns occur either in the late stages of business expansions (i.e., some time before peaks) or they interrupt long expansions. As a result, expansions are shorter and contractions longer in growth cycles than in business cycles. Growth cycles are more nearly symmetrical and less variable than business cycles with respect to both durations and amplitudes of their phases. Growth-cycle peaks tend to occur before the corresponding business-cycle peaks, while the troughs of the matching growth cycles and business cycles tend to be roughly coincident.

Figure 3 suggests a high degree of international correspondence in the timing of growth cycles. Thus, much (though not all) of the time, the diagrams for the United States and Canada, and those for the United Kingdom and West Germany, display nearly synchronous movements. Indeed, these chronologies are

considerably more similar than those of business cycles that can be inferred from figure 2. This presumably reflects the effects of the elimination or reduction of the divergencies in the national trends.

4. The Observed Tendencies, Disturbances, and Regularities

4.1 Endogenous Cyclical Variables

As we have seen, business cycles vary greatly in duration and intensity, less in diffusion. They are not only diverse but also evolving. What they have in common is not their overall dimensions but the make-up, features, and interaction of their many constituent processes.

Thus, in each cycle, whether long or short, large or small, production, employment, real incomes and real sales tend to expand and contract together in many industries and regions, though at uneven rates. Other variables, e.g., hours worked per week, real new orders for manufactured goods, and change in prices of industrial raw materials, rise and fall correspondingly but earlier, with variable leads. Still others, e.g., inventory-sales ratios, real business loans outstanding, and change in unit labor cost also rise in business expansions and fall in contractions but somewhat later, with variable lags. These sequential movements usually recur in each successive cycle. They all are significantly persistent and pervasive.

Systematic differences exist not only in the timing of cyclical movements in different variables but also in their relative size and conformity or coherence (i.e., correlation with business cycles). Among the earliest and most important observations in this area is that activities relating to durable (producer and consumer) goods have particularly large and well-conforming cyclical fluctuations. Other variables long and rightly viewed as highly

cyclical are business profits, investment in plant, equipment, and inventories, and cost and volume of bank credit used to finance such investments.

More than any other sector of the modern economy, manufacturing has historically been central to both economic growth and fluctuations. Mining, construction, transportation, communication, and public utilities have varying but significant degrees of cyclical sensitivity. Other nonfarm sectors, which produce largely services rather than goods tend to be much less responsive to business cycles. Employment in service industries broadly defined (including government) followed a strong and smooth upward trend. Agriculture, which underwent a long and strong downward trend in employment and a huge secular rise in productivity, is but weakly cyclical, except for prices. In sum, business cycles, which developed in the age of industrialization, still affect most strongly industries producing goods, especially durables (Zarnowitz and Moore 1986, pp. 536-39).

Given the weight of these "stylized facts", it is not surprising that the predominantly endogenous theories of business cycles, old and new, stress the role of those variables that have clear patterns of regular participation in the motion of the economy at large. These variables, which may be called "cyclical", and the corresponding theories, are named below.⁴⁰

1. Business fixed investment (overinvestment; vertical maladjustments; accelerator).
2. Inventory investment (multiplier-accelerator models with feedback effects).
3. Business profits (cost-price imbalances, profit margins and expectations).
4. Credit and interest rates (unstable supply of bank credit;

discrepancies between, and changes in, the money, real, and natural rates of interest).

The cyclical variables are endogenous — generated by the system of relationships within which they interact. In order for them to be primarily responsible for the business cycles, the system must have the required dynamics in form of some essential nonlinearities, or leads and lags, or both. Such elements are undoubtedly important, but we are still far from understanding well how they work, and hence how far the endogenous models can go in explaining business cycles.

4.2 Exogenous Variables and the Role of Money

Recent theories view economic fluctuations as resulting mainly from changes in observable exogenous factors (variables) or unobservable random shocks (errors). Here the cyclical variables, although still important as propagators of business cycles, are no longer seen as the central part of a system that can produce self-sustaining cycles.

Important policy variables such as the monetary base, tax rates, and federal government spending have been traditionally treated as exogenous, although this cannot be strictly true, since they are clearly influenced by the economy as well as influencing it. Money supply variables are of even more mixed nature in this regard. The extent to which a central bank controls the stock of money or (which is more relevant) its rate of growth depends on factors that vary across countries and over time. They include the national and international monetary systems; the powers, objectives, and performance of the bank; and the definition and composition of the supply of money.

In the United States, narrowly- and broadly-defined monetary aggregates

normally trend upward in both expansions and contractions, though often at reduced rates before downturns. Long absolute declines in M1 or M2 are rare and as a rule associated with business depressions or stagnations. Monetary growth rates tend to lead at business cycle peaks and troughs but by intervals that are highly variable and on average long (Friedman and Schwartz 1963a, 1963b). Cyclical changes in the deposit-reserve ratio and, particularly, the deposit-currency ratio, which reflect the chain of influence that runs from business activity to money, contribute on average strongly to the patterns of movement in money growth during business cycles (Cagan 1965; Plosser 1991). Money shows a systematic tendency to grow faster in business expansions than in contractions, and so does the domestic nonfinancial credit, but the stability of monetary relationships in the cyclical context is subject to much doubt and debate (B. Friedman 1986; Meltzer 1986). Certainly, there is more regularity in the long-term relation between money growth and changes in the price level, and in the procyclical behavior of interest rates and the income velocity of money (allowing for its long trends).

For all of this, there is no denying that business cycles have important monetary and financial aspects. A six-variable, four-lag quarterly vector autoregressive (VAR) model applied to postwar and earlier U.S. data by Zarnowitz and Braun (1990) shows that the rate of change in real GNP was significantly affected by lagged rates of change in the monetary aggregates (base, M1, and particularly M2) but much more strongly yet by lagged values of short-term interest rates. However, the influence of changes in the planned volume of fixed and inventory investment and purchases of durable goods (represented by series of new orders and contracts) proved to be strong as well.⁴¹

4.3 Monetary, Real, and Expectational Shocks

In the original monetarist theory, money supply was treated as the main exogenous factor driving the business cycle. In the more recent equilibrium version with rational expectations, the anticipated money growth can influence only prices, not output; that is, only unanticipated money shocks have real effects. Tests of this hypothesis have produced evidence that is mixed but mostly unfavorable in the sense of not confirming the importance of the distinction between the effects of the anticipated and unanticipated components of monetary change.⁴²

Full exogeneity of money is one extreme and unrealistic assumption; full endogeneity of money is another, at the opposite end of the spectrum. The latter view posits that changes in inside money accommodate the money stock to the level of economic activity; it is accepted both in some Keynesian disequilibrium models and the real business cycle (RBC) models in which fluctuations are strictly equilibrium phenomena.⁴³

In the RBC model, stochastic oscillations in the economy's real growth path are caused by a mixture of transitory and permanent shocks to productivity (Kydland and Prescott 1982). There is a long gestation lag in the production of capital goods, which imparts some persistence to output movements. As productivity gains fluctuate, so do real wages (or, more accurately, real returns on the work effort) to which labor supply responds very elastically.

But the cyclical sensitivity of real wages is low, and tests of the hypothesis of high intertemporal substitution of leisure are mostly negative (see, e.g., Altonji 1982). To explain booms and busts, sufficiently large and frequent shocks to productivity would be necessary, yet the evidence for them is hard to find (or nonexistent: has there been any technological regress of a

large-scale or recurrent nature?) When interpreted as productivity shocks, the procyclical movement of the Solow residual supports the RBC hypothesis, but this overlooks the high probability that much of this movement reflects the effects of labor hoarding and measurement errors (as noted in several critiques; see, e.g., Eichenbaum 1990). Indeed, a recent study whose authors include two RBC theorists finds that productivity disturbances account for no more than 35-44% of total output fluctuations in a cointegrated VAR model with both real and nominal variables (King, Plosser, Stock, and Watson 1991).

Much of the recent work that seems to be concerned with explaining business cycles is actually preoccupied with such perennial theoretical issues as the rationality of economic expectations and behavior and the neutrality of money. The predominant view is that stable growth at full employment would prevail in the absence of outside shocks; moreover, the shocks tend to be reduced to one or two broad categories per model. Thus, as already noted, the equilibrium theorists concentrate on either unanticipated changes in money and prices or shifts in technology. Some attention is given to shifts in preferences and desired consumption (Hall 1986). One study singles out sectoral demand shifts (Lilien 1982), another oil price shocks (Hamilton 1983). The role of shocks to, and imperfections of, credit markets is stressed by some authors (Wojnilower 1980; Greenwald, Stiglitz, and Weiss 1984), while the direct effects of independent shifts in monetary policy are central to others (Romer and Romer 1989).

However, there is also considerable and perhaps increasing recognition that macroeconomic fluctuations may have many important sources. Blanchard and Watson (1986) distinguish four major categories of shocks - to aggregate demand, aggregate supply, fiscal policy, and money supply - and conclude that each of

these made a roughly equal contribution to the U.S. postwar cycles. Occasional large disturbances are at work along with frequent small shocks, so that business cycles are quite differentiated. Recent papers by Blanchard and others generally assume that the effects of supply shocks are more persistent than those of demand shocks.

That a variety of factors can and do serve as proximate causes of business cycles is an old idea embodied in the synthetic theories of several early writers such as Aftalion, Mitchell, Schumpeter, and very explicitly Pigou (1927). Evidence from recent macroeconomic models supports this concept. Unlike the early Keynesian models dominated by demand factors and fiscal policy, the present models give considerable attention to supply factors as well, and actually have monetary policy matter more than fiscal. In large multi-sector models, the distinction between demand and supply shocks is rather blurred anyway.

Since the incisive and detailed analysis of the monetary history of the United States by Friedman and Schwartz (1963a), the monetarist interpretation of business cycle developments gained and still retains a wide acceptance, despite critical countercurrents within the profession. It is simply very difficult to deny that strong restrictive monetary measures designed to combat inflation have contributed to subsequent economic downturns at least in some well-known episodes (notably the Federal Reserve raises of the discount rate in 1920 and of reserve requirements in 1936-37). Similarly, the shift to a policy of lower money growth and sharply higher interest rates, first signaled in October 1979, was followed by the "Volcker disinflation" and the recessions of 1980 and 1981-82. In each case, however, these monetary shocks were accompanied by changes in factors unrelated to monetary policy that must have also contributed to the recessions that followed (fiscal stringencies in 1920 and 1936-37; an oil shock and

financial deregulation in the late 1970s, fall in money velocity in the early 1980s). So monetary and real disturbances (or unusual developments) coincided, and their effects are difficult to disentangle.

Nor are these the only types of disturbances to be considered, since there are also the "psychological" factors emphasized early by Pigou, that is, the shifts in expectations that may at times spread widely enough to become self-fulfilling. In contemporary models of financial crises or speculative price bubbles, multiple equilibria exist, and many of them involve expectations that appear arbitrary ex post yet are rational ex ante: many act on them because they believe that others will (see Woodford 1987 for a brief review).

The controversy about real vs. monetary theories of business cycles is now very old; it has been instructive but prolonging it further is apt to produce more heat than light. It is time to recognize that short-term variations in economic activity are influenced by forces of each of the three types - real, monetary, and expectational. Their mix varies, and the really important question is how they interact and why.

The recession of 1990-91 presents an interesting example, although more time and data will be needed to assess it. It was preceded by a long slowdown that started early in 1989, following a sharp decrease in monetary growth and increase in interest rates. Both monetary policy and credit conditions tightened. Efforts to counteract the persistently large government deficits made the fiscal policy quite tight, too. Real disposable income and real domestic final sales flattened and then turned down early. So both monetary and real factors worked to depress economic activity. They were finally joined by a sharp drop in consumer expectations and business confidence, which occurred after Iraq's invasion of Kuwait raised oil prices, the threat of war, and the general

level of uncertainty about inflation and unemployment. Thus the last blow was delivered to the old and by then seriously weakened expansion.

4.4 Leads and Lags

Presumably, one important reason for the differentiation of business cycles is that they are affected by large disturbances of all kinds, including shifts in policies. Also, changes in the economy's structure contribute to an evolution of cyclical behavior that is more predictable, though not without some important exceptions.⁴⁴ Still, business cycles are like individuals of a species: diverse yet also alike in many essential respects (think of other events of which the same can be said, e.g., wars). The main common element, as we already know, consists of the properties of comovements in cyclical variables.

Table 7 covers 32 U.S. monthly indicators for which there are available both the traditional measures of cyclical timing and variability (columns 2-6) and new measures of filtered cross-correlation with an index designed to approximate aggregate economic activity in real terms. The first set of statistics, from the Bureau of Economic Analysis (Commerce Department), refers to the period 1948-80; the second, from a NBER study by Stock and Watson, refers to the period 1959-89. The two are entirely independent and based on very different methods, yet they are generally consistent and complementary.

The first 17 series listed in table 7 are classified as leading at both peaks and troughs of business cycles and include ten components of the BEA index of leading indicators as of 1984 (marked *). They reflect marginal employment adjustments, which under uncertainty are made ahead of decisions that result in changes of employment and unemployment (lines 1-3); adjustments of delivery periods and activities marking the early stages of investment processes, which

tend to lead production, shipments, construction, and installation of equipment (lines 4-10); changes in inventories and sensitive prices (lines 11-13); and changes in money and credit conditions (lines 14-17).

Such series have a long history of leading at business cycle peaks and troughs. They are heavily represented in a group of 75 series whose median timing at 15 peaks and 16 troughs of the period 1885-1937 was -6(5) and -5(3), respectively (i.e., leads six and five months, with standard deviations of five and three months; for sources and detail, see Zarnowitz and Moore 1986, pp. 565-71). In 1948-80, the means (s.d.), in months, of the median leads were -11(3) at peaks and -2(2) at troughs (as calculated from the entries in lines 1-17, columns 2 and 3). Thus, the relative timing of these indicators remained remarkably consistent over the past century, although the leads at peaks have become longer and the leads at troughs shorter since 1948 than before.⁴⁵

Leads maximize correlations with an index of coincident indicators in 1959-89 for all but two of the series used in lines 1-17, columns 7-9.⁴⁶ This is a strong confirmation of the tendency of these series to move ahead of aggregate economic activity (output, employment, real income and real sales). But these leads (column 8) average -2(3) months, hence are considerably shorter than the corresponding "all turns" leads (column 4), which average -6(3) months.

This would be expected for the following reasons. The differences in timing are likely to be larger and more systematic for the major cyclical movements than for the many small and short variations that may often be caused by random influences which affect many variables more or less simultaneously. The cyclical measures in columns 1-3 mostly refer to the levels of the indicators (except where the title specifies change), but the correlation measures in columns 7-9 mostly refer to smoothed rates of change, including those in the

coincident index itself (note the prevalence of $DLN = \Delta \ln$ in column 7).⁴⁷ Thus, the former relate directly to business cycle turning points, whereas the latter relate directly to all observations for growth cycles. The series that lead at business cycle turns also tend to lead at growth cycle turns, in the United States and elsewhere (Klein and Moore 1985). But the leads at business cycle peaks are particularly long, reflecting high levels of demand and capacity utilization, large backlogs of unfilled orders, and extended delivery periods. Growth cycle peaks typically occur several months before business cycle peaks and have shorter leads and signals (Zarnowitz and Moore 1982).

It should be noted that table 7 covers monthly indicators only, hence omits one particularly important class of leaders available in quarterly form only, namely corporate profits (totals, rates, and margins, before and after taxes, in current and constant dollars; also net corporate cash flows). Profits decline in late stages of expansion well before sales do because costs start rising faster than selling prices, depressing profit margins in many businesses. Labor markets get tight and wages rise even as productivity slackens; interest rates and cost of holding inventories rise; but product prices tend to increase less, being held back by prior commitments and domestic and international competition for market shares. (Mitchell hypothesized such developments as a major cause of business cycles in his earliest treatise of 1913). Stock price indexes tend to have strong cyclical leads (line 12) because they anticipate or reflect the early movements in profits and also in inverted interest rates, as well as probably other changes such as those in money and credit (lines 15 and 16).

Roughly coincident indicators of employment, production, real personal income, and real sales are listed in lines 18-24 of table 7 (the four marked * are components of the BEA coincident index). Here coincidences (0) or very short

leads (-1) dominate both the all-turns and maximum-correlation timing (columns 4 and 8), but in a few cases longer leads appear, mainly at peaks, for industrial production and sales. All of these series have pronounced growth trends and are used in log differences for the correlation measures.

The indicators listed in lines 25-32 are classified as lagging in the historical NBER studies and BEA reviews of cyclical indicators (the five marked * are components of the BEA lagging index). The common feature of these series is that they are associated with cost of doing business. Increases in the duration of unemployment raise the private and social burdens of joblessness and insurance against it. Labor cost per unit of output is the largest component of average costs on the economy-wide scale. Interest rates measure the costs of credit and financing investments of various types. The larger the inventories are relative to sales, and the larger the volume of credit is relative to income, the heavier are the costs of finance, given the level of interest rates. Accordingly, the lagging increase in these cost factors around the business cycle peak works to discourage economic activity, and their lagging decrease around the trough works to encourage it. Indeed, when inverted (i.e., divided into one), the lagging index shows the earliest cyclical signals that anticipate even the turning points in the leading index (Moore 1983, chap. 23).

The eight series in the last section of table 7 have sizable median lags, averaging in months about +3(3) at peaks, +7(4) at troughs, and +5(3) at all turns (columns 2-4). It is broadly consistent with the lagging nature of these indicators that five of them also show the best correlations for lags (which are long, except for the two series of first differences in short-term interest rates; see columns 7-9). For three series that tend to lag at business cycle turns (inventory-sales ratio, unit labor cost, and corporate bond yields), the

correlations with the coincident index refer to leads, but they are negative. This is consistent with the old and well-established finding that the inverted lagging indicators lead.⁴⁸

4.5 Comovements and Amplitudes

The typical leads and lags of the major economic variables constitute important and relatively enduring features of cyclical behavior. Another class of such characteristics relates to how close the comovements of the variables tend to be in the course of business expansions and contractions. Still another consists of relative amplitudes of cyclical change in the different processes.

The correlations in the last column of table 7 provide estimates of the comovements of the selected indicators with an index that approximates well the aggregate economic activity on a monthly basis. The Stock-Watson index of coincident indicators (denoted ICI for simplicity) resembles the BEA coincident index rather closely but has a formal probabilistic interpretation. Of the leading series (lines 1-17), capacity utilization, the help-wanted index, and the two aggregates of new orders show the highest positive $r(k)$ of .89-.96, while unemployment insurance claims has -.87 (lines 2-6). Average workweek, contracts and orders for plant and equipment, and inventory change show $r(k)$ correlations of .76-.79; seven other indicators, including in descending order real money supply, change in credit, vendor performance, housing permits, and stock prices have $r(k)$ of .55-.68; and for two series these measures are very low indeed (-.40 for failure liabilities and .25 for M1 growth).

Not surprisingly, the correlations of the individual coincident indicators with the ICI are high (lines 18-24). They range from .92 to .99 for five of the series, and are .87 for real personal income less transfer payments but only .69

for real retail sales. Industrial production indexes for total and durable manufacturing show the highest $r(k)$ coefficients.

The comovements of the lagging indicators with the ICI are not very close. The highest correlations here are the negative ones for unemployment duration, inventory-sales ratio, and unit labor cost (lines 25-27). Two series on credit and two on short-term interest rates have $r(k)$ of .52-.63, the bond yield has one of only -.45 (lines 28-32).

The conventional method of analyzing time series for the study of business cycles is to estimate and then eliminate their seasonal components. Working with seasonally adjusted series (just as working with trend-adjusted or heavily smoothed series) is often convenient but not without risks.⁴⁹ Even after seasonal adjustment, the month-to-month change in most series contains a large component of short random variations; the cyclical component represents a much longer and smoother movement that is often much smaller than the total change on a per-month basis (compare the paired entries in columns 5 and 6).⁵⁰ Some leading indicators show great volatility of monthly change, which obscures the relatively small trend-cycle movement (inventory investment and business failures provide extreme examples, see lines 11 and 16). In contrast, some other early-moving series are remarkably smooth to begin with, and are dominated by cyclical fluctuations (e.g., the help-wanted index, capacity utilization, and vendor performance, lines 3, 4, and 7) or by the trend-cycle (e.g., real money supply, line 15). Most of the leading indicators fall somewhere in the broad intermediate range, that is, they display great overall sensitivity and have both clear specific cycles and many smaller random oscillations.

The coincident indicators have generally much smaller, and also more uniform, amplitudes of monthly total and cyclical change than the leading

indicators. The following tabulation, which uses only percent entries from

	<u>Total change</u>	<u>Trend-cycle change</u>
Leading (11 series)	5.4(7.6)	1.5(0.8)
Coincident (7 series)	0.8(0.4)	0.6(0.2)

columns 5 and 6, brings out the contrast between the two groups. Behind it are important particulars. Thus, consider manufacturing of durable goods, where much of the production is to order. Here new orders move in large swings that are followed with variable but significant lags by much smaller fluctuations in outputs and shipments. The resulting changes in backlogs of unfilled orders and average delivery lags are also large, leading, and procyclical. Production of nondurable goods is both less cyclical and less volatile than that of durable goods (lines 22 and 23), and production of services (not shown) is least, again on both counts.

Other related or similar examples may be just mentioned.⁵¹ New housing permits (and starts) lead residential investment, which is somewhat smoother. New orders and contracts for plant and equipment lead business capital outlays, which fluctuate much less and lag behind considerably, particularly at troughs. Other commitments and activities marking the early stages of investment processes are new capital appropriations, new business formation and incorporations, new bond and equity issues (all strongly procyclical and leading), whereas other late-stage processes are completions of industrial and commercial construction projects, shipments and installations of machinery.

Interest rates tend to lag at business cycle turns, especially troughs, but they are both strongly influenced by, and themselves strongly influence, the

general business conditions. All vary procyclically, but the short-term rates have larger cyclical movements than long-term rates (lines 30-32). Their changes are measured in their own units, as is also the case for some other series in this group (lines 25-26), so no amplitude comparisons can be made here with measures expressed in terms of percent changes. But let us note that several important lagging indicators have strongly predominant trend-cycle components and are very smooth (notably so for commercial and industrial loans outstanding and the ratio of consumer installment credit to personal income; see lines 28 and 29).

5. General Conclusions

In this paper, I have considered the short but no-so-easy question "What is a business cycle?" from several angles. Part 1 looked at economic history and at the development of thinking about business cycles. Part 2 reviewed the chronologies of business expansions and contractions; the lessons from the duration data; the concepts of periodicity of cycles and phases; and the evidence and reasons for the apparent moderation of macroeconomic fluctuations in the post-World War II era. Part 3 compared the postwar business cycles and growth cycles in several major industrialized, market-oriented countries. Part 4 discussed the behavior of endogenous and exogenous variables; the role of monetary, real, and expectational shocks; the systematic timing sequences (tendencies to lead or lag); and the regularities of cyclical comovements and amplitudes. Understanding business cycles can be aided by each of these modes of analysis.

Some sections of this study interpret history, others literature; some

discuss old, others new findings and ideas. Many of the results refer to particular aspects of theory and evidence, and there is no need to restate any of them. Hence only a few general conclusions are collected here.

1. A business cycle includes a downturn and contraction followed by an upturn and expansion in aggregate economic activity, which ideally should be represented by comprehensive and reliable measures of total employment, output, real income, and real expenditures. (But nominal income aggregates and price indexes can serve as good criteria, provided that the fluctuations extend to a broad class of sufficiently flexible prices, as was the case in the now rather distant past.)

2. A business cycle is pervasive in the sense that it consists of comovements and interactions of many variables. The regularity, magnitude, and timing of the fluctuations vary across the variables, and these differences are in part systematic. Thus, most activities are procyclical, mildly or strongly, but some are countercyclical. Some variables tend to have approximately coincident timing, others tend to lead, and still others tend to lag. These patterns may or may not be symmetrical, e.g., timing may be systematically different at peaks and troughs.

3. A business cycle is at least national in scope, that is, it involves most industries and regions of a country, though again with variations in intensity and timing. It can attain much larger dimensions when transmitted across countries through channels of international trade and finance.

4. A business cycle lasts as a rule several years and so is sufficiently persistent for serially correlated as well as intercorrelated movements in many variables to develop sequentially in the downward as well as upward direction. The movements tend to cumulate before reversing themselves.

5. In most but not all business cycles, prices in general move procyclically, at least apart from their long trends (in the last half-century, upward). This indicates a long and large role for the fluctuations of, and disturbances to, aggregate demand. These can be of real, monetary, or expectational origin, and may well involve interactions between any or all such factors. But supply shifts are also part and parcel of business cycles, and they may be dominant in some. (The two major oil price shocks in the 1970s have been associated with inflationary recessions.) The cyclical instability of profits, investment, and credit has a long history and is well documented.

6. Business cycles have varied greatly over the past 200 years in length, spread, and size. They included vigorous and weak expansions, long and short; mild and severe contractions, again some long, some short; and many moderate fluctuations of close-to-average duration (about 3-5 years). But since the 1930s the United States suffered no major depression. Business expansions have become longer, recessions shorter and milder. The probable reasons include the shift of employment to production of services, automatic stabilizers, some financial reforms and avoidance of crises, greater weight and some successes of governmental actions and policies, and higher levels of public confidence.

7. The postwar recessions were much fewer and generally milder still in France, Italy and, particularly, West Germany and Japan. These countries also had much higher average rates of real economic growth than the United States, especially in the early reconstruction phase of the post-1945 era. In the 1970s and 1980s, growth decreased everywhere and the recessions became more frequent and serious. All this suggests that countries and periods with stronger growth trends are less vulnerable to cyclical instability. This is a potentially important proposition that is in need of explanation and testing (with possible

extensions to regions, industries, etc.).

8. In sum, business cycles make up a class of varied, complex, and evolving phenomena of both history and economic dynamics. Theories or models that try to reduce them to a single causal mechanism or shock seem to me altogether unlikely to succeed.

Footnotes

1. In a letter of June 27, 1772, David Hume informed Smith that "We are here in a very melancholy situation: Continual bankruptcies, universal loss of credit ... Do these events any-wise effect your theory?" Smith's answer is unknown (see Mirowski 1985, pp. 15-18).
2. See Haberler [1937] 1964; Zarnowitz 1985; Moore and Zarnowitz 1986; Backhouse 1988; Sherman 1991.
3. Thus, for England he listed 14 crises in 1803-82 at intervals averaging 6.1 years, with a standard deviation of 2.6 and a range of 1-10 years (see also Burns and Mitchell 1946, p. 442).
4. See Burns and Mitchell 1946, Table 16, pp. 78-79.
5. For arguments and some evidence consistent with the above, see Backhouse 1988, chs. 2 and 5.
6. Schumpeter refers to Mitchell and Spiethoff as disagreeing with him on this point.
7. See Mirowski 1985, pp. 201-213. The other sources of the crisis chronologies in question are Bouniatian 1908, Ashton 1959, and Deane 1967. All authors agreed on two dates, three agreed on six, and two agreed on ten (out of the 13 dates proposed by Ashton). For 1700-1802, Ashton suggested a sequence of 16 "cycles," with durations averaging about 5 years and concentrated mainly in the 3-6 years' range (Moore and Zarnowitz 1986, pp. 741-43).
8. The coverage of the annals is: United States and England, 1790-1925; France, 1840-1925; Germany, 1853-1925; Austria, 1867-1925; and twelve other countries on four continents (various periods between 1890 and 1925).

9. This is certainly consistent with the recent evidence on the performance of business outlook analysts, policy makers, and forecasters (see Fels and Hinshaw 1968; Zarnowitz 1967, 1974).
10. Of course, many seemingly familiar facts or events are complex or controversial enough to elude a tight formulation of meaning, say, in a dictionary or legal sense. One is reminded, for example, of Justice Potter Stewart's writing, in the 1964 case of *Jacobellis vs. Ohio*, that obscenity was indeed difficult to define but "I know it when I see it."
11. For some detail on the historical statistics applied in the construction of the business cycle chronology for the United States, see Zarnowitz 1981 and Moore and Zarnowitz 1986, and references therein.
12. For a further analysis along these lines, see Zarnowitz 1985 and 1991.
13. From the introduction by Burns to the posthumous book by Mitchell (1951, pp. VII-VIII).
14. Something similar could be said as well about some earlier important influences, notably that of Marx.
15. Early accelerator models made investment a function of changes in output (Aftalion 1913; Clark 1917). The more general and satisfactory formulation equates investment to some fraction of the gap between the desired and actual capital stock.
16. This excludes the expansions during the Civil War and World War I periods, which were longer than the average and different in some respects. Business contractions that followed these expansions had shorter than average durations. But these distinctions are blurred by the fact that some peacetime expansions were even longer and some

peacetime contractions were shorter. Compare lines 5 and 6 in Table 1.

17. The rest of this section draws on material in Moore and Zarnowitz 1986, pp. 754-58.
18. During the short but sharp and widespread 1920-21 decline, Germany was insulated by hyperinflation and the associated floating exchange rate (Friedman and Schwartz 1963a, p. 362). During the similarly diffuse and painful 1937-38 contraction, Germany was no longer a free market economy but a controlled economy under the Nazi dictatorship, and heavily engaged in arming for the war, annexing Austria, invading Czechoslovakia, and threatening other neighboring countries.
19. The first of these is covered mainly by annual data (the duration measures are expressed in monthly terms for comparability). Combining the two periods would add little to the story.
20. This contraction is omitted from the chronology of Spiethoff (1955, p.
21. However, Friedman and Schwartz do not recognize the 1901 trough and the 1903 peak included in the NBER chronology for Britain (1982, p. 74).
22. Thus, assuming that 1869-70, 1887-88, and 1899-1900 represented major slowdowns rather than marginal recessions, the period 1857-1918 would contain 12 (not 15) business cycles with an average length of 5 (not 4) years.
23. Indeed, using the latter would only strengthen the case, since the relative frequency of expansions has been somewhat greater in the long upswings of prices, that of contractions in the long downswings (Zarnowitz and Moore 1986, p. 530).
24. The results of this combination include a sharp increase in the real debt burdens; distress selling of assets to pay off the debts;

contraction of deposits; declines in production, trade, and employment; depressed confidence; and lower nominal but higher real interest rates. However, when the liquidation process and the debts and costs are reduced sufficiently in real terms, confidence will gradually return, hoarding will give way to new buying and lending, and reflation will pave the way to another recovery.

25. For more on the association between the price trends and the relative duration of business cycle phases, see Zarnowitz and Moore 1986, pp. 530-31.
26. A hazard function shows the dependence of the termination or "failure" probability on the duration of the process; in this case, the probability of a peak (trough) as a function of the length-to-date of the preceding expansion (contraction). Let $F(t) = \Pr(T < t)$ be the probability that the duration random variable T is less than some value t ; $f(t) = dF(t)/dt$ be the corresponding density function; and $S(t) = 1 - F(t)$ be the corresponding "survivor function". Then the general form of the hazard function is $\lambda(t) = f(t)/S(t)$ (see Kiefer 1988).
27. The following discussion draws in part on material from Zarnowitz 1985 and 1987.
28. Consider the consequences of such natural disasters as cyclones and storm surges in the Bay of Bengal (for India and Bangladesh) and hurricanes and shifts in ocean currents (for fishing off the coast of Peru).
29. See Alt and Chrystal 1983. For some more positive appraisals and recent contributions, see Willett 1988.
30. The measures are based on estimates by Balke and Gordon (1986, pp. 788-810) which use the historical annual series by Gallman and

Kuznets and more recent series of the U.S. Department of Commerce. Persons' index of industrial production and trade (1875-1918) and the Federal Reserve System index of industrial production (1919-46) were used as quarterly interpolators.

31. Similarly, the index for Taiwan available since 1961 shows only one serious decline, of 9.1%, in 12/73-2/75 (a minor decline of 1.3% occurred in 1/90-8/90). Unlike Taiwan and Japan, the economy of South Korea escaped a recession in 1973-75, but had one in 1979-80. The Korean index declined by 10.3% in 3/79-11/80, its only lapse from growth since its beginning in 1963.
32. Taking into account the divergencies between the periods covered by the indexes does not alter this conclusion.
33. For a description of the international indicators, see Moore and Moore 1985.
34. The Japanese series refers to the number of employees on payrolls in all nonagricultural establishments (private and government-owned). The series for U.S., Canada, France, and Italy cover nonfarm employment; for U.K., manufacturing, mining, construction, and public utilities; and for West Germany, mining and manufacturing.
35. The theories of hysteresis explain the persistence of high unemployment by making long-run equilibrium depend on history. Adverse shocks reduce demand for physical or human capital or both as well as the demand for labor. Or "insider" workers keep real wages high and "outsider" workers out of jobs (Blanchard and Summers 1986).
36. This assumes that investment is predominantly productive in nature, well allocated by market forces, and supported rather than hindered by government policies.
37. In this paper, volatility is associated with productivity shocks, but

I suspect that the analysis of the Rameys has broader applicability.

38. See Klein and Moore 1985; Klein 1990; Lahiri and Moore 1991.
39. This count does not include the recessions of 1990-91 in the United States, Canada, and the United Kingdom, and the concurrent slowdowns or possibly recessions in any of the other three countries. Although the initial dates (peaks) of some of these movements have been established, at least tentatively (see figure 3), their severity and duration cannot as yet be known.
40. The listing uses broad labels and offers only selected types of theory. The theories are in general not mutually exclusive and are often used in combinations, with varying emphases. See Haberler [1937] 1964 and Zarnowitz 1985 for surveys of the literature.
41. Still other, weaker effects accounted for in this model are those of changes in a fiscal-policy variable and in the price level. One should remember that a VAR model shows the lead-lag interactions among all the selected variables, allowing also for the effects of their own lagged values (i.e., for the serial correlations which are high in many important economic aggregates).
42. On the monetary policy ineffectiveness in the new classical macroeconomics, see Lucas 1972, 1973, and Sargent and Wallace 1975; on tests, see Barro 1978, Boschen and Grossman 1982, and Mishkin 1983.
43. That is, prices clear markets, expectations are rational and adjust promptly, and all opportunities for mutually beneficial transactions are used up.
44. Thus, the shift from production of goods to production of services made employment much less cyclical, as already noted in section 2.7 (see also Zarnowitz and Moore 1986, pp. 536-38). But the 1990-91 recession, although relatively mild, was unusually harsh in causing a shrinkage of jobs in many

service-producing industries. It is much too early to tell, however, whether this constitutes a reversal of the previously observed trend, and if so to what extent.

45. It can also be shown that the opposite change occurred for the lagging indicators, where the lags have become shorter at peaks and longer at troughs (see *ibid*). These changes are explained by the shift toward longer business expansions and shorter recessions in the postwar era.
46. The two exceptions are the change in sensitive materials prices (line 14), where the indicated k_{max} timing is 0 (coincident), and the change in inventories (line 11), where it is a lag of 6 months. This last result seems puzzling, since inventories tend to lag in levels but lead in changes.
47. Only the average workweek, the diffusion index of slower deliveries (vendor performance), housing permits, and change in business and consumer credit—all series with little trend—are used in level form (N) for the entries in columns 7-9.
48. The leads are particularly long in the case of inverted bond yields (line 32) or, which amounts to much the same, indexes of corporate bond prices (Zarnowitz 1990). Note also that the average duration of unemployment, like other series on unemployment, is naturally taken in inverted form to match like turns in business activity. This indicator has a roughly coincident timing at peaks but substantial and regular lags at troughs (line 25).
49. The big difference between seasonal and business cycles is that seasonal movements are much more periodic (more truly "cyclical") and much more capable of being anticipated. Over short spans within the year, seasonal fluctuations dominate the changes in many variables, but over longer spans of several years it is the movements associated with business cycles (the

~specific cycles~) that are predominant. The risk is that seasonal and cyclical movements may interact so that their workable separation is impeded.

50. The cyclical (actually, trend-cycle) component is estimated as a weighted moving average (Henderson curve) chosen on the basis of the relative amplitude of the irregular and cyclical movements. Most series are smoothed with a 13-month device, but a 9-month formula is used for relatively smooth and a 23-month formula for very volatile series. See Zarnowitz and Boschan [1975] 1977, p. 173.
51. Any documentation would require more data, mainly in quarterly form.

Table 1

Durations of Business Expansions and Contractions in Four Countries,
Selected Periods between 1790 and 1938

A. Phase and Cycle Durations, in Months: Means and Standard Deviations (S.D.)

Line	Period (No. of Business Cycles) ^a		Expansion ^b		Contraction ^c		Full Cycle (T to T)		Full Cycle (P to P)	
	T to T (1)	P to P (2)	Mean (3)	S.D. (4)	Mean (5)	S.D. (6)	Mean (7)	S.D. (8)	Mean (9)	S.D. (10)
<u>United States</u>										
<u>Excluding Civil War & WWI</u>										
1	1854-79(4)	1857-82(4)	26	7	27	26	53	31	61	27
2	1879-97(5)	1882-99(5)	25	7	19	11	44	17	41	11
3	1897-1915(5)	1899-1913(4)	22	8	20	5	42	4	40	11
4	1919-38(5)	1918-37(5)	26	15	20	13	46	16	45	29
5	1854-1938(19)	1857-1937(18)	25	9	21	14	46	18	46	21
	<u>All cycles^d</u>									
6	1854-1938(21)	1857-1937(20)	26	11	22	14	48	18	48	20
7	1790-1938(35)	1790-1938(33)	28	14	23	16	50	24	50	20
<u>Great Britain</u>										
<u>Excluding WWI</u>										
8	1854-79(5)	1857-82(5)	40	9	36	28	76	37	79	32
9	1879-1914(5)	1882-1912(5)	43	17	25	16	68	26	67	36
10	1919-38(5)	1918-37(5)	26	24	20	10	47	21	45	33
11	1854-1938(15)	1857-1937(15)	36	18	27	19	63	29	64	34
	<u>All cycles^d</u>									
12	1854-1938(16)	1857-1937(15)	37	18	26	19	63	29	64	33
13	1790-1938(29)	1796-1937(28)	39	18	22	16	60	24	62	28
<u>France</u>										
<u>Excluding WWI</u>										
14	1865-87(5)	1867-81(5)	22	3	30	23	52	25	56	31
15	1887-1914(5)	1881-1913(4)	39	21	26	14	65	28	67	32
16	1919-38(6)	1920-37(6)	24	11	15	8	39	14	38	10
17	1865-1938(16)	1867-1937(15)	28	15	23	17	51	24	52	26
	<u>All cycles</u>									
18	1865-1938(17)	1867-1937(16)	29	15	22	16	51	23	52	25
<u>Germany</u>										
<u>Excluding WWI</u>										
19	1879-1914(6)	1882-1913(5)	39	16	32	21	71	26	75	34
20	1919-32(3)	1918-29(3)	29	12	23	15	53	25	43	8
21	1879-1932(9)	1882-1929(8)	36	15	29	18	65	26	63	31
	<u>All cycles</u>									
22	1879-1932(10)	1882-1929(9)	37	14	27	18	64	24	63	29

B. Shortest (S) and Longest (L) Durations, in Months

Line	Period ^a (1)	No. of Business Cycles		Expansion ^b		Contraction ^c		Full Cycle (T to T)		Full Cycle (P to P)	
		T to T (2)	P to P (3)	S (4)	L (5)	S (6)	L (7)	S (8)	L (9)	S (10)	L (11)
<u>United States</u>											
23	1790-1855	14	13	12	72	12	72	24	108	24	84
24	1854-99	10	10	18	46 ^d	8	65	30	99	30	101
25	1899-1938	11	10	10	50	7 ^e	43	28	64	17	93
<u>Great Britain</u>											
26	1792-1858	14	14	24	72	12	36	36	84	36	108
27	1854-1900	6	6	30	64	6	81	39	135	36	123
28	1900-38	10	9	8	61	6 ^e	37	26	79	17	98
<u>France</u>											
29	1865-95	6	5	19	41	11	68	34	95	33	109
30	1900-38	11	11	8	52	8	30	24	92	24	110
<u>Germany</u>											
31	1879-1904	4	3	17	61	18	61	35	102	41	122
32	1904-32	6	6	16	52	12	40	28	77	34	69

^aThe years are those of the initial and terminal business cycle troughs (T) in column 1, and those of the initial and terminal business cycle peaks (P) in column 2, according to the NBER monthly chronology. The numbers in parentheses refer to complete T to T or P to P cycles in the given period. The entries in columns 7 and 8 correspond to the dates in column 1; the entries in columns 9 and 10 correspond to the dates in column 2. The wartime cycles consist of expansions during the Civil War (for the United States) and World War I (WWI) for all four countries; also, of the immediately following contractions (for the T to T cycles) or the immediately preceding contractions (for the P to P cycles).

^bMeasured from troughs (T) to peaks (P).

^cMeasured from peaks (P) to troughs (T).

^dThe reference cycle chronologies contain annual segments for the United States, 1790-1855, and Great Britain, 1792-1858. In Part A, lines 7 and 13, observations based on these dates but converted from annual to monthly durations are combined with the observations based on the monthly reference chronologies that begin in 1854 for both the United States and Great Britain.

^eYears refer to the earliest and latest reference dates in each segment. Entries in lines 23 and 26, columns 4-10, are converted from annual to monthly durations (see note d).

^fRefers to a wartime cycle.

Source: National Bureau of Economic Research. For detail, see Moore and Zarnowitz 1986, Tables A.2 and A.3.

Table 2
 Durations of Business Expansions and Contractions in United States,
 Selected Periods between 1938 and 1990 and between 1854 and 1990

Line	Period (No. of Business Cycles) ^a		Expansion ^b		Contraction ^c		Full Cycle (T to T)		Full Cycle (P to P)	
	T to T (1)	P to P (2)	Mean (3)	S.D. (4)	Mean (5)	S.D. (6)	Mean (7)	S.D. (8)	Mean (9)	S.D. (10)
<u>1938-90, excl. wartime cycles</u>										
1	1938-61(3)	1945-60(3)	33	8	10	2	43	8	42	9
2	1961-82(3)	1960-90(4)	50	34	13	6	48	18	62	38
3	1938-82(6)	1945-90(7)	43	26	11	4	46	13	53	30
<u>1938-90, all cycles</u>										
4	1938-61(5)	1945-60(5)	45	21	9	1	54	20	55	23
5	1961-82(4)	1960-90(5)	61	39	12	5	65	38	73	41
6	1938-82(9)	1945-90(10)	53	31	11	3	59	28	64	33
<u>1854-1990, all cycles</u>										
7	1854-1919(16)	1857-1918(15)	27	10	22	14	48	19	49	18
8	1919-45(6)	1918-1945(6)	35	26	18	13	53	22	53	32
9	1945-82(8)	1945-1990(9)	50	31	11	4	56	27	61	33
10	1854-1982(30)	1857-1990(30)	35	23	18	12	51	22	53	26
<u>Shortest (S) and Longest (L) Durations, in Months</u>										
			S	L	S	L	S	L	S	L
<u>Excluding wartime cycles</u>										
11	1938-82(6)	1945-90(7)	12	92	6	16	28	64	18	108
12	1854-1938(19)	1857-1945(19)	10	50	8	65	30	99	17	101
<u>All cycles</u>										
13	1938-82(9)	1945-90(9)	12	106 ^d	6	16	28	117 ^d	18	116 ^d
14	1854-1938(21)	1857-1945(21)	10	80 ^d	7 ^d	65	28	99	17	101

^aT denote initial and terminal troughs, P denote initial and terminal peaks. Entries in columns 7 and 8 correspond to the dates in column 1; the entries in columns 9 and 10 correspond to the dates in column 2. The wartime cycles consist of expansions during Civil War, World War I and II, the Korean war and the Vietnam war; also, of the immediately following contractions (for the T to T (for the T to T cycles) or the immediately preceding contractions (for the P to P cycles).

^bMeasured from troughs (T) to peaks (P).

^cMeasured from peaks (P) to troughs (T).

^dRefers to a wartime cycle.

Table 3
Trends in Wholesale Prices and the Business Cycle Phase Durations,
United States 1789-1990 and Three European Countries between 1854
and 1935

Line	Trend in Wholesale Prices		Business Expansions ^c		Business Contractions ^c		Ratio of Average Durations, E/C (7)
	Direction and Dates in Years ^a (1)	First to Last Year Change (percent p.a.) ^b (2)	Number (3)	Average Duration (E) in Months (4)	Number (5)	Average Duration (C) in Months (6)	
<u>United States</u>							
	<u>Rising</u>						
1	1789-1814	3.1	5	42	4	22	1.9
2	1843-64	4.7	6(5)	32(30)	5	15	2.1 (2.0)
3	1896-1920	5.1	7(6)	23(20)	6	18	1.3 (1.1)
4	1932-90 ^d	4.1	11(8)	53(44)	10	11	4.6 (3.8)
5	Total or Average ^d	4.2	29(24)	40(34)	25	16	2.5 (2.1)
	<u>Falling</u>						
6	1814-43	-3.1	6	27	7	27	1.0
7	1864-96	-3.2	7	25	8	26	1.0
8	1920-32	-6.9	3	23	4	22	1.0
9	Total or average	-3.9	16	25	19	25	1.0
<u>Great Britain</u>							
	<u>Rising</u>						
10	1854-73, 1896-1920	3.6	10	30	8	17	2.2
	<u>Falling</u>						
11	1873-96, 1920-33	-2.3	5	30	7	38	0.8
<u>France</u>							
	<u>Rising</u>						
12	1865-73, 1896-1926	6.4	11	31	9	15	2.1
	<u>Falling</u>						
13	1873-96, 1926-35	-2.6	4	30	6	34	0.9
<u>Germany</u>							
	<u>Rising</u>						
14	1895-1923	2.3	6	40	6	18	2.2
	<u>Falling</u>						
15	1922-33	-4.2	4	32	4	42	0.8

^aThrough 1932 based on Burns and Mitchell 1946, p. 432. For 1932-82, see Moore 1983, p. 240.

^bFor the United States 1789-1982, see Zarnowitz and Moore 1986, p. 527. For other countries, see the sources listed in Burns and Mitchell 1946, p. 432. Author's calculations are based on the data for the initial and terminal years; the averages are weighted by the durations in years of the periods covered.

^cThe NBER monthly business cycle chronologies are used. See Zarnowitz and Moore 1986, pp. 528-29. Entries in parentheses exclude wartime expansions (Civil War, World Wars I and II, Korean War and Vietnam War).

^dUpdated by author's calculations.

Table 4
Depth and Diffusion of Business Contractions in the United States,
1920-1982

Line	Business Cycle Contraction ^a (1)	Percentage Change ^b in			Unemployment Rate		Nonfarm Employment, % Contracting ^d (7)
		Real GNP (2)	Industrial Production (3)	Nonfarm Employment (4)	Maximum ^e (5)	Percentage Increase ^e (6)	
A. Selected Business Contractions							
1	1/1920-7/1921(D)	n.a.	-32.4	n.a.	11.9	10.3	97
2	10/1926-11/1927(M)	-2.0	-7.0	n.a.	4.4	2.4	71
3	8/1929-3/1933(GD)	-32.6	-53.4	-31.6	26.9	21.7	100
4	5/1937-6/1938(D)	-13.2	-32.4	-10.8	20.0	9.0	97
5	11/1948-10/1949(S)	-1.5	-10.1	-5.2	7.8	4.5	90
6	8/1957-4/1958(S)	-3.3	-13.5	-4.3	7.3	3.7	88
7	10/1969-11/1970(M)	-1.0	-6.8	-1.5	5.9	2.6	80
8	11/1973-3/1975(S)	-4.9	-15.3	-2.9	8.8	4.3	88
9	1/1980-7/1980(M)	-2.3	-8.5	-1.4	7.7	2.2	77
10	7/1981-11/1982(S)	-3.0	-12.3	-3.1	10.7	3.6	79
B. Averages by Degree of Severity							
11	Two Major Depressions ^a	-13.4	-32.4	-10.6	16.0	9.6	97
12	Six Severe Recessions ^f	-3.3	-13.1	-3.8	7.7	3.8	88
13	Four mild Recessions ^g	-1.7	-3.8	-1.7	6.2	2.3	77

Source: Moore and Zarnowitz 1986, Table A.7.
n.a. - not available.

^aSymbols in parentheses classify the contractions as follows: GD, Great Depression of 1929-33; D, depression; S, severe recession; M, mild recession.

^bMeasured from peak to trough in quarterly data for real GNP and monthly data for industrial production and nonfarm employment.

^cEntries for 1920-33 (lines 1-3) are annual averages (monthly data not available).

^dBefore 1948 based on cyclical changes in employment in 41 industries. Since 1948 based on changes in employment over six-month spans in 30 industries (1948-59); 172 industries (1960-71); and 186 industries (1972-82).

^e1920-21 and 1937-38 (as marked D above).

^fIncludes the recessions of 5/1923-7/1924 and 7/1953-5/1954 in addition to the four marked S above.

^gIncludes the recession of 4/1960-2/1961 in addition to the three recessions marked M above.

Table 5
 Variabilities of Relative Change and Amplitudes of Cyclical Movement,
 Real GNP and Prices, 1875-1918, 1919-45, and 1946-83

Line	Period ^a	Log Differences		Expansions ^b			Contractions ^b		
		Mean	S.D.	Number	Mean Duration (quarters)	Mean Amplitude (percent)	Number	Mean Duration (quarters)	Mean Amplitude (percent)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<u>Real Gross National Product</u>									
1	1875-1918	1.0	2.4	12	8.9	17.3	12	3.2	-5.1
2	1919-1945	0.8	3.6	4	11.0	30.1	5	6.0	-14.1
3	1946-1983	0.8	1.2	7	16.3	20.9	8	2.6	-2.5
<u>Wholesale (Producer) Price Index</u>									
4	1875-1918	0.3	3.3	11	6.6	12.1	10	6.9	-11.8
5	1919-1945	-0.2	4.1	4	8.2	15.4	5	8.6	-21.6
6	1946-1983	1.1	2.3	4	12.0	8.7	5	5.0	-4.8

^aNumber of quarterly observations per series: 1875, 175; 1919-45, 107; 1946-83, 151. The annual dates refer to the first and last turning points of the series during each period.

^bIdentified by specific cycle peaks and troughs in the series. Expansions are measured from peaks to troughs, contractions from troughs to peaks. Only complete upward and downward movements are counted.

Source: Calculated from data in Balke and Gordon 1986, pp. 788-810 (see note 30).

Table 6
Average Durations and Amplitudes of Expansions and Contractions
in Composite Indexes of Coincident Indicators, Eight Countries, 1948-91

Line	Country	Period Covered	Dates of Turning Points		Number	Expansions		Contractions		
			First ^a (P or T)	Last ^b (P or T)		Mean Duration (months)	Mean Amplitude (percent)	Number	Mean Duration (months)	Mean Amplitude (percent)
1	U.S.	1948-91	48(P)	90(P)	8	49	30.4	8	13	-9.1
2	Canada	1948-91	51(P)	90(P)	5	82	57.8	5	12	-3.4
3	U.K.	1952-91	52(T)	90(P)	6	63	29.2	5	15	-4.1
4	France	1955-91	58(P)	91(P)	4	88	47.6	4	11	-5.8
5	Italy	1948-91	48(T)	91(P)	6	77	60.2	5	18	-4.9
6	W Germany	1950-91	50(T)	91(P)	4	101	110.8	3	26	-6.5
7	Japan	1954-91	54(T)	91(P)	3	140	430.7	2	10	-4.6
8	Australia	1950-91	51(P)	90(P)	5	81	65.1	5	12	-7.5

^aThe following initial or early low values are assumed to represent trough dates: Italy, 1/48; West Germany, 1/50; Japan, 6/54 (see figures 2A and 2B).

^bThe following late or terminal values are assumed to represent peak dates: France, 1/91; Italy, 1/91; West Germany, 4/91; Japan, 2/91 (see figures 2A and 2B).

Source: Center for International Business Cycle Research, Graduate School of Business, Columbia University.

Table 7
Selected Measures of Average Cyclical Timing, Variability, and Correlation with an Index of
Coincident Indicators, Thirty-two Monthly Series, 1948-80 and 1959-89

Line	Series Title (BCD Number) ^a	Median Timing ^b		Average Change ^c		Cycl. Compo- nent	Trans- forma- tion	Lag(k) (mos)	Correlation w/New ICI ^d r(k)
		Peaks	Troughs	All Turns	Series (s.a.)				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
		months		(percent)					
1	Average workweek, mfg (*1)	-11	-1	-4.5	.5	.2	N	-1	.79
2	Unempl. insur. claims, inv. (*5)	-12	0	-5.5	5.4	2.4	DLN	-2	-.87
3	Help-wanted index (46)	-7	+2	-2.5	2.9	2.2	DLN	-1	.95
4	Capacity utilization, mfg (82)	-11	+1	-1.5	1.6 ^x	1.4 ^x	D	-1	.96
5	New orders, dur. goods, c\$ (7)	-8	-1	-3	3.4	1.4	DLN	-1	.90
6	N.O., cons, goods & mtl's, c\$ (*8)	-12	-1	-4.5	2.8	1.3	DLN	-2	.89
7	Vendor performance (*32)	-6	-4	-6	3.8 ^x	2.4 ^x	N	-2	.67
8	Contr. & orders, plant & equip (*20)	-8	-1	-3.5	6.2	1.6	DLN	-1	.76
9	New bldg permits, priv. housing (*29)	-13	-3	-9.5	5.1	2.4	N	-6	.59
10	New bus. incorporations, no. (13)	-10	-1.5	-5	2.5	1.0	DLN	-3	.55
11	Change in mfg & trade invent. (31)	-6	-2	-3.5	7.1 ^x	1.4 ^x	DLN	6	.79
12	Stock price index, S&P 500 (*19)	-9.5	-4	-5.5	2.7	1.6	DLN	-6	.55
13	Change in sensitive mtl's prices (*99)	-9.5	-3.5	-5.5	.3 ^x	.2 ^x	DLN	0	.55
14	Change in money stock, M1 (85)	-15	-3	-14	.3 ^x	.03 ^x	DLN	-3	.25
15	Money supply M2, c\$ (*106)	-16	-3	-10	.42	.37	DLN	-6	.68
16	Change in bus. & cons. credit (*111)	-11	-2	-7	2.9 ^x	.8 ^x	N	-2	.67
17	Liab. of bus. failures, inv. (14)	-14	-2	-10	27.8	2.5	DLN	-3	-.40
18	Employees on nonag. payrolls (*41)	0	0	0	.32	.28	DLN	1	.92
19	Pers. income - transfer pmts, c\$ (*51)	0	-0.5	0	.5	.4	DLN	0	.87
20	Mfg & trade sales, c\$ (*57)	-3	-1	-1.5	1.0	.6	DLN	-1	.94
21	Index of industrial production (*47)	-2	0	0	.9	.7	DLN	0	.99
22	Indus. prod., dur. mfg (73)	-3	0	0	1.4	1.0	DLN	0	.98
23	Indus. prod., nondur. mfg (74)	-1	-1	-1	.7	.6	DLN	-1	.92
24	Retail sales, c\$ (59)	-4	-2	-2.5	1.1	.5	DLN	-2	.69
25	Unempl., aver. duration, inv. (*91)	0	+8	+3.5	3.6	1.6	N	6	-.88
26	Invent./sales, mfg & trade, c\$ (*77)	+8	+13	+10	.02 ^x	.01 ^x	N	-2	-.79
27	Unit labor cost, mfg, detrend. (*62)	+5	+13	+10	.6 ^x	.3 ^x	DLN	-2	-.69
28	Comm. & indus. loans outst., c\$ (*101)	+4	+6	+4.5	.9	.7	DLN	10	.63
29	Cons. instal. credit/pers. inc., % (*95)	+4	+7	+6	.07 ^x	.05 ^x	DLN	6	.57
30	Treasury bill rate, 3 mo. (114)	+1.5	+3.5	+2	.28 ^x	.17 ^x	D	1	.52
31	Federal funds rate (119)	+2	+5	+2.5	.38 ^x	.26 ^x	D	1	.59
32	Yield, high grade corp. bonds (116)	+1	+2	+1.5	.18 ^x	.09 ^x	D	-12	-.45

^aSeries titles are abbreviated. The BCD numbers in parentheses are series numbers used by the U.S. Department of Commerce in its monthly publications Business Conditions Digest (BCD, through March 1990) and Survey of Current Business (SCB, current). * identifies a series included in the composite index of leading or coincident or lagging indicators (referring to the indexes of the Bureau of Economic Analysis in the Commerce Department as of 1984).

^bThe measures cover the seven pairs of business cycle peaks and troughs between 1948 and 1980.

The median is the middle value in an odd-numbered array and the average of the two middle values in an even-numbered array. Minus (-) signs are leads at business cycle turning points; plus (+) signs are lags.

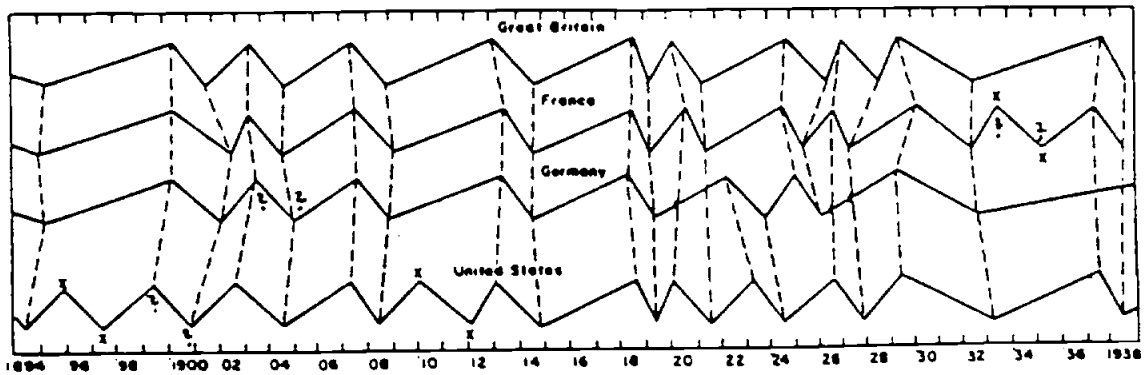
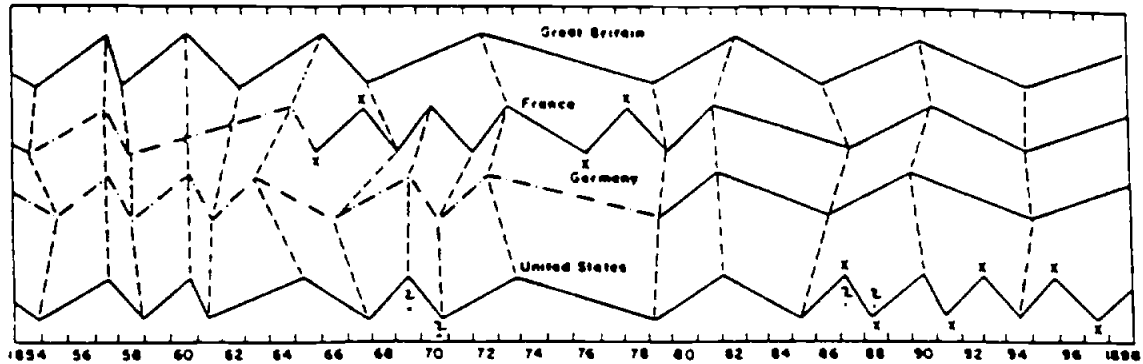
^eEntries in column 5 are average changes, without regard to sign, between consecutive values in a seasonally adjusted (s.a.) series. Entries in column 6 are average changes, without regard to sign, between consecutive values in the cyclical component, which is a smooth, flexible moving average of the seasonally adjusted series. Entries marked * are average actual changes in the series, in its original units of measurement; all other entries are average percentage changes.

^dThe transformation codes (column 7) are: N - no transformation; D - first differences of the series; DLN - first differences of the natural logs of the series (i.e., growth rates). The transformations are generally from the original levels of the (s.a.) series. Entries in column 8 (k) are leads (-) or lags (+), in months, which are associated with the maximum correlations $r(k)$, as listed in column 9. These statistics are based on the cross-correlogram between filtered log ICI and the filtered series, using the 24-month moving average filter $a_{24}(L)$. ICI is the new experimental index of coincident indicators by Stock and Watson; it covers the period January 1959 - May 1989.

Abbreviations: mfg - manufacturing; dur. - durable; insur. - insurance; mtl - materials; invent. - inventories; contr. - contracts; comm. - commercial; cons. - consumer; instal. - installment; pers. - personal; inc. - income; outst. - outstanding; pmts. - payments; nonag. - nonagricultural; / - ratio (inventory/sales in Line 26; credit/income in Line 29); c\$ - in constant dollars; inv. - inverted (peaks in the series are matched with business cycle troughs, troughs in the series are matched with business cycles peaks); detrend. - adjusted for (deviations from) trend.

Source and detail: U.S. Department of Commerce 1984, Tables 8 and 9A, pp. 167-68, 172-75 (for columns 1-6); Stock and Watson 1990, Table 1 (for column 7-9).

Figure 1
Timing of Reference Cycles for Four Countries and Matched
Turning Points, 1854-1938



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

Figure 2A
COINCIDENT INDICES (adjusted)
 Japan and W.Germany

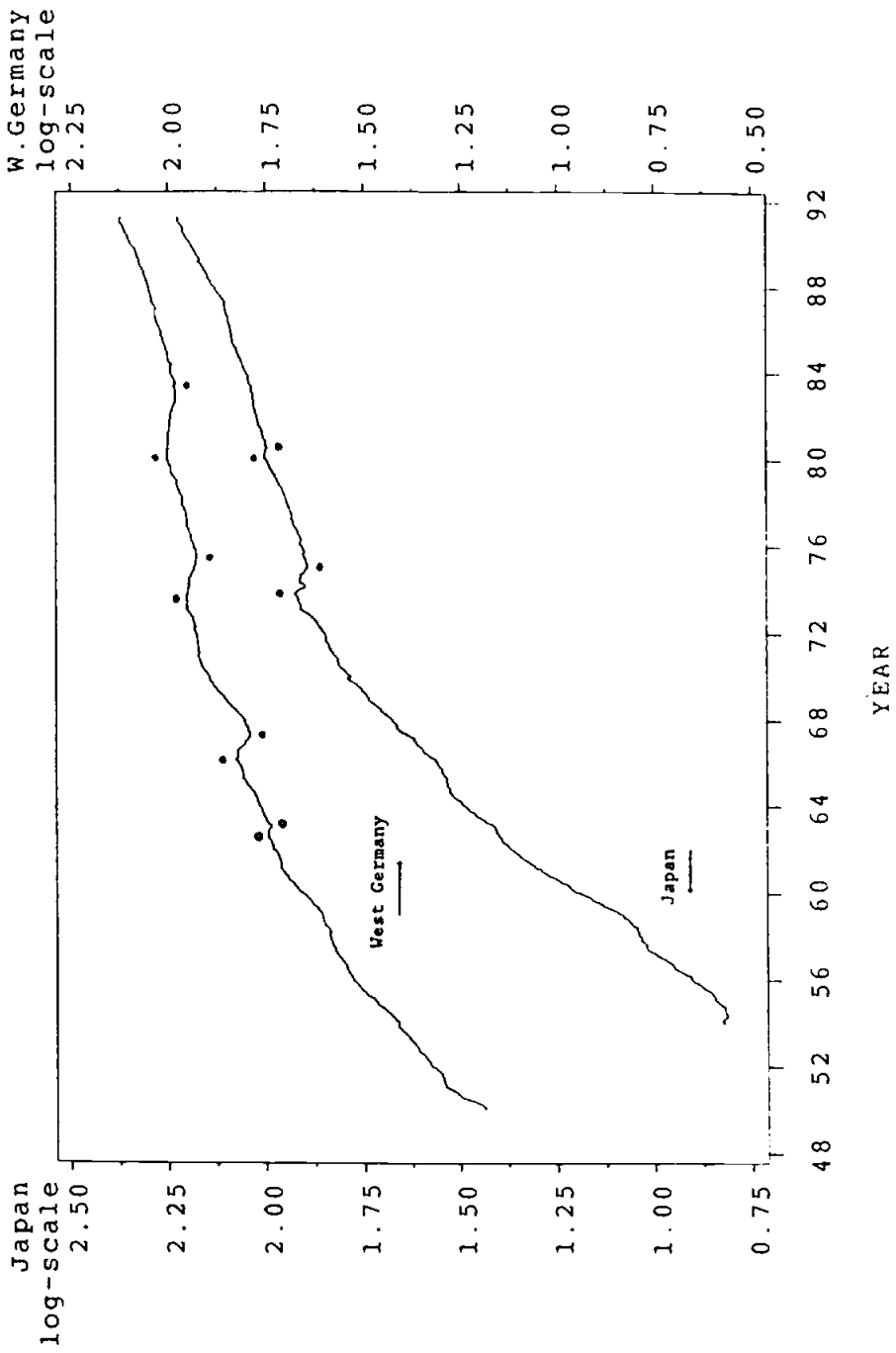


Figure 2B
COINCIDENT INDICES (adjusted)
France and Italy

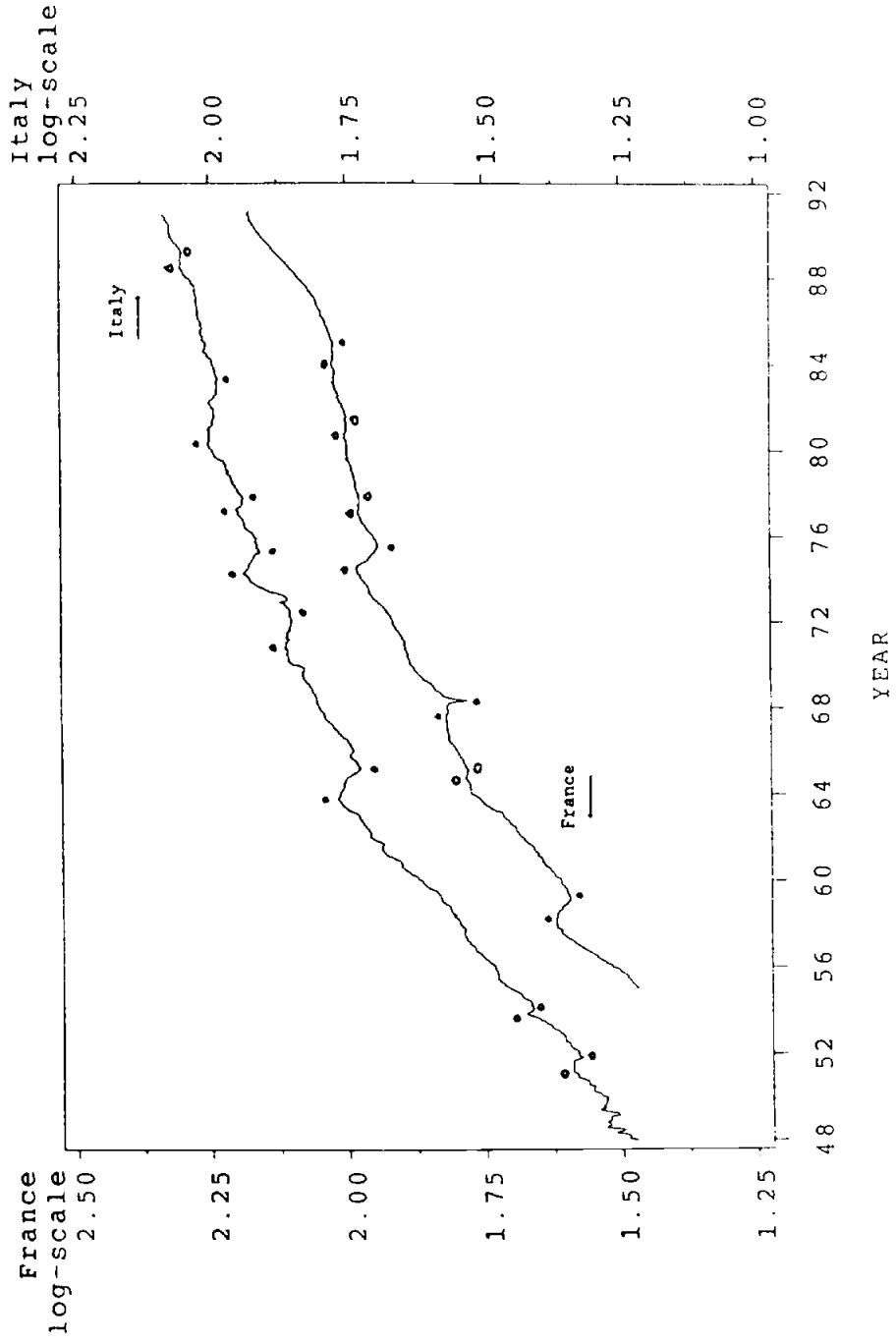


Figure 2C
COINCIDENT INDICES (adjusted)
 Canada and U.K.

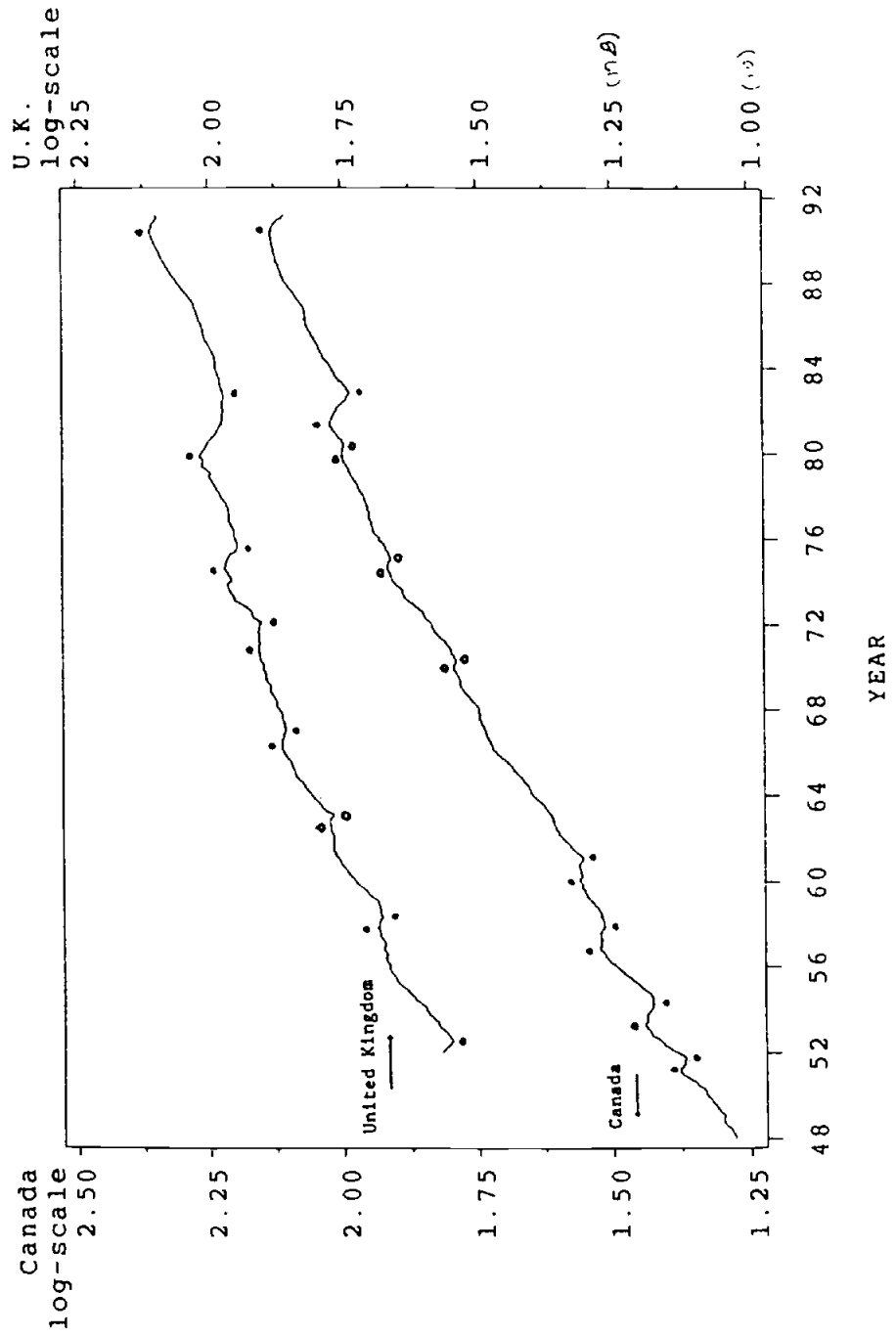


Figure 2D
COINCIDENT INDICES (adjusted)
Australia and U.S.

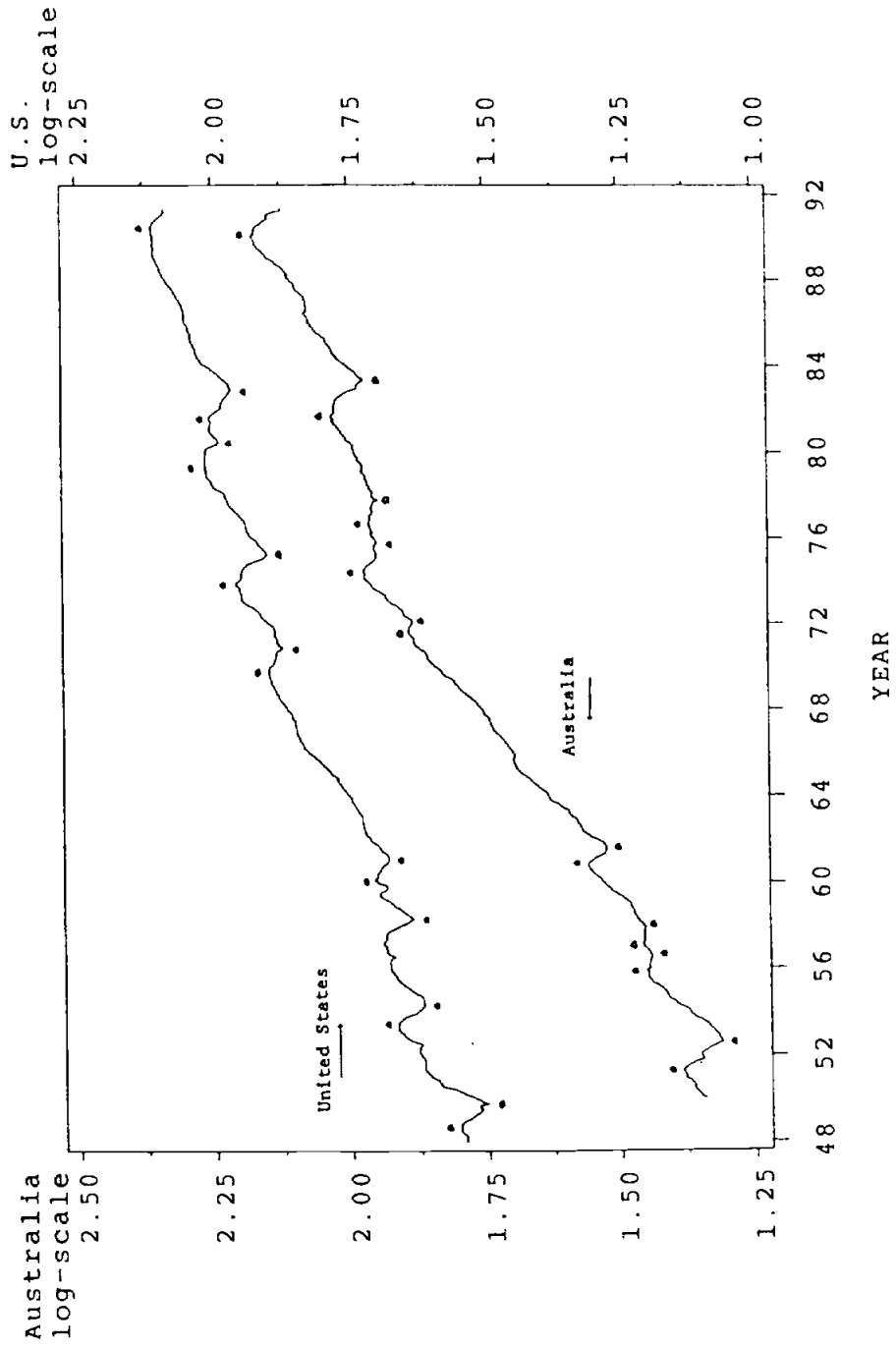
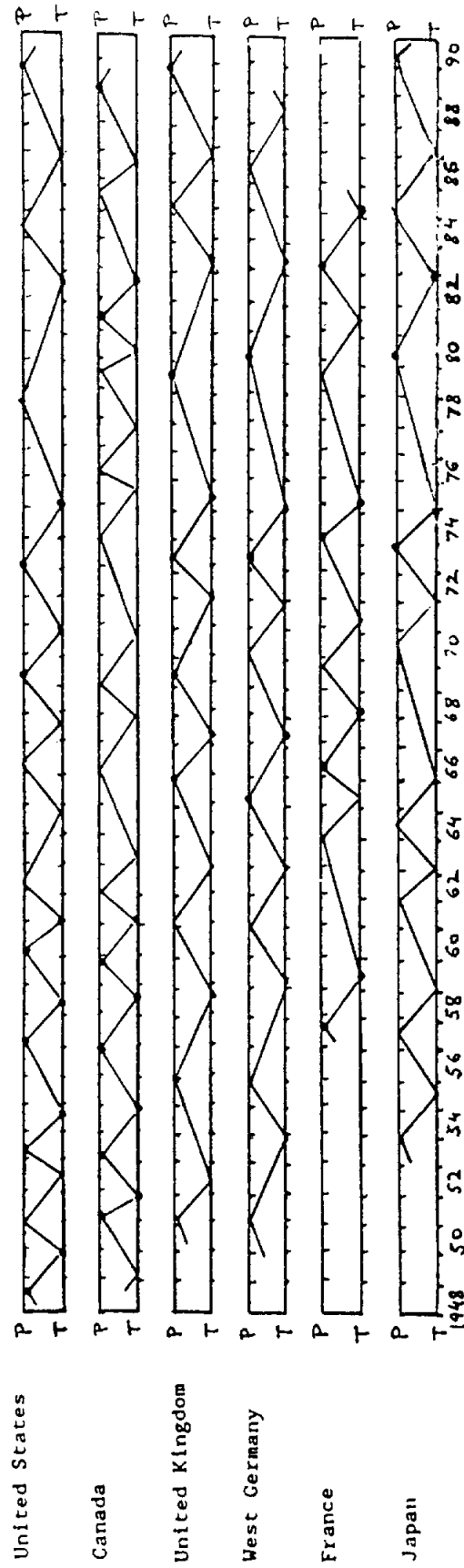


Figure 3
Timing of Growth Cycles in Six Countries, 1948-80



Note: In each schematic diagram, the drawn-out lines connect the dates of the consecutive peaks (P) and troughs (T) in growth cycles for the given country. Heavy black dots identify slow-downs that became recessions.

Source: For the U.S. business cycle chronologies - National Bureau of Economic Research, Inc. For the growth cycle chronologies of Canada, U.K., West Germany, France, and Japan - Center for International Business Cycle Research, Graduate School of Business, Columbia University.

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