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Volume Author/Editor: Klein, Philip A. and Geoffrey H. Moore

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Chapter Author: Philip A. Klein, Geoffrey H. Moore

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Chapter 1

INTRODUCTION

For many years a system of leading, coincident, and lagging economic indicators, first developed in the 1930s by the National Bureau of Economic Research (NBER), has been widely used in the United States to appraise the state of the business cycle. Since 1961 the current monthly figures for these indicators have been published by the U.S. Department of Commerce in *Business Conditions Digest.* Similar systems have been developed by government or private agencies in Canada, Japan, the United Kingdom, and more recently in many other countries. A few years ago the Organization for Economic Cooperation and Development (OECD) set up a working party to develop this type of analysis and most of the member countries participated. The Center for International Business Cycle Research (CIBCR) has given guidance in this field to some fifteen countries in recent years in Europe, Asia, the Middle East, Africa, and South America.

Our purpose in this chapter is to explain briefly the theory and rationale underlying this approach to economic forecasting. We will also provide a brief summary of our study, detailing how the indicators have performed in practice, in the United States and nine other countries. The book will conclude with some suggestions for future research and development, including the application of the approach to the analysis of inflation.

MITCHELL'S VIEW OF BUSINESS CYCLE ANALYSIS

Wesley Clair Mitchell's first major work on business cycles was published in 1913.[1] Many of his contemporaries thought business cycles were essentially short-run, self-correcting phenomena scarcely in need of special policy, let alone study. From the very beginning Mitchell seems to have understood the necessity of acquiring factual information about economic instability before attempting to develop theoretical explanations for the phenomena so many others of that time chose to ignore. As long ago as 1927, for example, Mitchell wrote: "For theoretical uses, there is needed a systematic record of cyclical alternations of prosperity and depression, covering all countries in which the phenomena have appeared, and designed to make clear the recurrent features of the alternations."[2] Thus, the approach to the analysis of instability was international virtually from the outset. What Mitchell proposed to do was to examine the "cycles of reality" in a fairly large numbr of countries by amassing as many of the statistical records of these fluctuations as could be found. This was one of the reasons why in 1920 he launched the National Bureau of Economic Research. It is critical to bear in mind that this statistical collection and analysis was but a part of his overall plan that was basically directed toward explaining these cycles of reality. We should, therefore, underscore that in the 1927 comment quoted above it was for theoretical uses that the systematic statistical record was needed. The methodology to be summarized in Chapter 2 was many years in the making, and involved a lengthy process of collection and detailed analysis of many time series that together were and continue to be reflections of the fluctuations market-oriented economies have experienced at least since the Industrial Revolution.

This methodology was essentially completed in the late 1930s and was presented in a 1946 volume by Arthur F. Burns and W.C. Mitchell entitled *Measuring Business Cycles.*[3] When Burns and Mitchell published this pioneering work, it represented the culmination of a quarter century's thought about the nature of cyclical disturbances in industrialized market-oriented economies and how such disturbances might be studied. The book set off arguments about whether or not one could productively measure anything without a "proper" theory or hypothesis, and there were arguments at a more technical level surrounding the methodology itself. Thus, debate in the 1940s frequently revolved around the relationship of the National Bureau methodology to earlier theories of business fluctuations, as well as to

the relationships between the Mitchellian approach to cyclical analysis, the Keynesian policies of the day, and the emergent econometric revolution.

Today instability manifests itself primarily by widespread and more or less unremitting difficulties in controlling inflation and unemployment in most of the industrialized market-oriented economies of the developed world. Economists of whatever methodological persuasion, and of whatever policy school, are increasingly being asked to account for the continued presence of phenomena that have proved remarkably resistant to both understanding and control. Why do we continue to experience business cycles? Is another recession as severe as 1973–75, let alone 1929–32, likely to occur? How do cycles spread from one country to another? How can they best be ameliorated? These are among the most pressing economic questions of our time. Mitchell's methodology and the business cycle indicators he launched have a contribution to make to the international search for answers.

A Mitchellian Perspective: Measurement with Theory

It is widely held that Burns and Mitchell's *Measuring Business Cycles* was nontheoretical, if not antitheoretical. They considered the relation of their work to extant theories of business fluctuations and stated their view of the relationship of what they were doing to that body of theory in the following way:

> Our aim is to determine as thoroughly as we can what business cycles are. . . . This objective is always before us in later monographs, where we prepare materials as well as we can in advance for a systematic attack in a theoretical volume. But we believe that an intelligible notion of what business cycles are can best be reached from available statistical records by a process of successive approximation. The primary objective of our monograph on cyclical behavior is to describe in a preliminary way the typical features of business cycles.[4]

Mitchell died before the theoretical volume could be written, but as this and many other passages make clear, he regarded his work as a necessary stage in the development of a viable and reasonably realistic theory of business fluctuations.

The approach Burns and Mitchell took largely eschewed many previous theoretical explanations, and we shall return to those explanations and their relationship to the Bureau's methodology. Here we note only that Burns and Mitchell both regarded the methodology and their book detailing that methodology as contributing to a theo-

retical understanding of cyclical instability. Having developed the methodology, for example, and having developed ultimately a set of indicators that typically lead or lag behind business cycle turning points emerging from the application of that methodology, Mitchell commented, "No attempt is made [here] to explain why the series behave as they do, but anyone who goes over the entries thoughtfully will find his mind seething with rationalizations, and with conjectures regarding the effects produced by the recorded movements."[5] That this was Burns's view as well is clear from many of his statements. In his introduction to *What Happens During Business Cycles*, for example, Burns no doubt expressed his own as well as Mitchell's wish when he noted,

> The wish to contribute to economic policy was strong in Mitchell. Stronger still was his conviction that intelligent control of business cycles depends upon sound theoretical understanding, which requires tolerably full and accurate knowledge of what the business cycles of experience have been like.[6]

It is true that *Measuring Business Cycles* made more references to statisticians and others concerned with measuring cycles than to the multitude of economists who have tried to develop theories of the cycles. There are references to Jevons, Juglar, Keynes, Schumpeter, and the like. But there are more references to Leonard Ayres, Roger Babson, Frederick Macaulay, Geoffrey Moore, Frederick Mills, Warren Persons, Willard Thorp, and others whose work is even now rarely connected with any particular theory of instability. There are also references to investigators like Abramowitz who defy such neat categorization.

Economic theory in general has scarcely been immune to the charge of oversimplification. In this regard it is worth recalling that at the end of his summary of extant business cycle theories, R.A. Gordon felt compelled to comment, "None of these models should be taken too seriously as an explanation of what happens during the cycles of reality. They are too simple."[7] Whatever else one says of the methodology developed at the National Bureau, it did not regard the cycle as a simple phenomenon.

Rejecting the simplistic, therefore, Mitchell and his co-workers at the National Bureau determined to begin with a review of the statistical record. Burns and Mitchell wrote, "The way we have chosen is to observe the business cycles of history as closely and systematically as we can before making a fresh attempt to explain them."[8] The material set out in *Measuring Business Cycles*, initially criticized as "measurement without theory,"[9] has long since been accepted and forms the basis of much current cyclical analysis in the United States.

The Role of Reference Dates

One of the crucial steps in the Burns-Mitchell approach to the analysis of cyclical disturbances lies in the choice of reference dates. "Reference dates" is the National Bureau's term for the peaks and troughs, selected after study of many time series and chosen to represent the turning points in a country's business cycles. The considerations that enter into their selection, originally quite judgmental, have now been codified to be programmed for the computer.[10] Computer-selected turning points are still corroborated by visual inspection, however, because of known inadequacies in the programmed criteria.

Reference dates are important because they ultimately form the basis for subsequent analysis of all time series, including the classification into leading, roughly coincident, or lagging indicators. These indicators, discussed in the next section of this chapter, represent kinds of economic activity, culled from long years of experimentation with literally hundreds of series, which, in the experience of National Bureau analysis, have historically been most reliable in forecasting, recording, and confirming U.S. business cycles. It is important, therefore, that reference dates reflect as accurately as possible the shift from expansion to contraction in "the aggregate economic activity" of the business enterprise economies to which Burns and Mitchell applied their technique.

The choice of reference dates begins with the selection of appropriate turning points in a number of individual time series, primarily those series that in themselves constitute measures of aggregate economic activity—that is, income, output, employment, and trade. The considerations involved in such selections are, of course, akin to those used for choosing turning points in any time series. The conversion of such information into reference dates involves judicious determination of what constitutes the "preponderence" of evidence with respect to cyclical fluctuations in aggregate economic activity. Ultimately, one can judge the appropriateness of the reference dates by the behavior of a variety of measures of economic activity around these points of reference. Thus, while the reference dates are required to differentiate leading, roughly coincident, and lagging indicators, the appropriateness of the dates can also be judged, when there is a considerable historical record on which to base timing classifications, by the consistency with which leaders lead, coinciders coincide, and laggers lag. In a sense, the analysis of timing becomes an interactive process.

Since the original formulation by Burns and Mitchell, such a historical record has, of course, been built up, most particularly for the United States. But *Measuring Business Cycles*, despite its understand-

able emphasis on the United States, included an effort to develop reference cycle chronologies for other countries as well.

THE INDICATOR SYSTEM

The leading, coincident, and lagging indicators cover a wide variety of economic processes that have been found to be important in business cycles. The leading indicators are, for the most part, measures of anticipations or new commitments. They have a "look-ahead" quality and are highly sensitive to changes in the economic climate as perceived in the marketplace. The coincident indicators are comprehensive measures of economic performance, pertaining to output, employment, income, and trade. They are the measures to which everyone looks to determine whether a nation is prosperous or depressed. The lagging indicators are more sluggish in their reactions to the economic climate, but they serve two useful functions. First, since lagging indicators are usually very smooth, they help to confirm changes in trend that are initially reflected in the more erratic leading and coincident indicators. Second, their very sluggishness can be an asset in cyclical analysis, because when they do begin to move, or when they move more rapidly, they may show that excesses or imbalances in the economy are developing or subsiding. Hence, the lagging indicators frequently provide the earliest warnings of all, as when rapid increases in costs of production outstrip price increases and threaten profit margins, thus inhibiting new commitments to invest, which are among the leading indicators.

The list of the "most reliable indicators" has been revised a number of times (1938 was the first such publication, and subsequent revisions were made in 1950, 1960, 1966, and 1975). Our study of international economic indicators is based heavily on the 1966 U.S. list.[11] This list was the current one at the time the international work was begun. As we shall illustrate below, however, many of these indicators have survived one of the longest continuous testing programs of empirical findings against subsequent data in the field of economics—from 1938 to 1976. These indicators are at the heart of the international analysis presented here.

The procedure in selecting and classifying indicators is one in which economic theory and empirical observation closely interact. The indicator that has a near-perfect record of performance during a business cycle, but whose behavior cannot be explained, will not command or warrant much attention, since faith depends on understanding. On the other hand, the indicator that is suggested by theoretical considerations but has not been tested or does not perform

as theory predicts will not command much attention either, since faith depends on performance. With these precepts in mind let us look at the classification of U.S. indicators that we have been using in developing an international system of business cycle indicators (Table 1-1).

The first column on the left lists six broad types of economic process that figure in most theories of the business cycle. Most of the variables that are today employed in econometric models can be found under one or another of these categories. There are, however, some important exceptions. Foreign trade is not shown explicitly, although it is implicit in the second group (production, income, consumption, and trade). Taxes and government expenditures do not appear explicitly either, although they are conspicuous in most models. Here the reason is not that government has no impact on the business cycle, but rather that most measures of its activity have not performed very consistently as indicators. The same comment could be made about agricultural production.

The indicators in the body of the table were selected from the six types of economic process, again with a view both to their contribution to theory and empirical performance. Performance has been judged primarily with respect to the consistency with which the measure has conformed to business cycles and led, coincided, or lagged behind the cycles' turning points. An indicator can have too many cycles or too few; one-to-one correspondence is preferable. An indicator can lead on some occasions and lag at other times; uniformity in timing is preferable. Other criteria play a role too. Comprehensive coverage of the economy is preferable to narrow coverage. Prompt availability of current figures is important, and, coupled with that, monthly figures are preferred to quarterly.

Within each of the economic process groups, reading across the table, are indicators that lead as well as those that coincide or lag. This is one reason for thinking of them as processes. The activities represented normally follow a sequence. The average workweek, for example, is one of the first variables pertaining to employment that manufacturing enterprises change, either by increasing or reducing the amount of overtime work or by changing the number of persons working short hours or fewer days per week. Changes in the number of persons employed usually occur a few months later, because such changes are less easily reversed and are more expensive to accomplish.

Every entry in Table 1-1 has been supported by detailed studies showing that the indicators not only behave in the manner specified by the classification but also that there are cogent economic reasons for this behavior. In addition, these studies have considered not only

Table 1-1. Cross-Classification of U.S. Indicators by Economic Process and Cyclical Timing.[a]

Economic Process	*Cyclical Timing*		
	Leading	*Roughly Coincident*	*Lagging*
Employment and unemployment	Average work week, manufacturing New unemployment insurance claims, inverted	Nonfarm employment Unemployment, inverted	Long-duration unemployment, inverted
Production, income, consumption, and trade	New orders, consumer goods and materials[b]	Gross national product[b] Industrial production Personal income[b] Manufacturing and trade sales[b]	
Fixed capital investment	Formation of business enterprises Contracts and orders, plant and equipment[b] Building permits, housing		Investment expenditures, plant and equipment[b]
Inventories and inventory investment	Change in business inventories[b]		Business inventories[b]
Prices, costs, and profits	Industrial materials price index Stock price index Profits[b] Ratio, price to unit labor cost, nonfarm		Change in output per man-hour, manufacturing, inverted
Money, credit and interest rates	Change, consumer installment debt[b]		Commercial and industrial loans outstanding[b] Bank interest rates, business loans

Notes to Table 1-1

a. The list and classification is substantially the same as that prepared in 1966 and published in Geoffrey H. Moore and Julius Shiskin, *Indicators of Business Expansions and Contractions* (New York: National Bureau of Economic Research, 1967). The chief modification is that those series marked with note (b) are converted to constant prices. The timing classification for each series is the same as shown in *Business Conditions Digest* for all turns (see Table 1, column 1, in any recent issue), except as follows: Unemployment is unclassified (*U*) at all turns in *BCD* because it leads at peaks and lags at troughs, but here it is classified roughly coincident, as in the 1966 list. Four series that here are in constant prices are shown in *BCD* only in current prices: change in consumer installment debt, investment expenditures for plant and equipment, commercial and industrial loans outstanding, and change in output per man-hour, manufacturing, inverted, which is the constant price equivalent of labor cost per unit of output. The constant price series are assigned the same classification as the current price series.

Although the indicators listed here share a common ancestry and rationale with those currently used in the composite indexes published in *Business Conditions Digest*, only about half the series are identical. A number of series in the two lists are closely related but some are quite different. Despite these differences, the movements in the U.S. indexes shown below are broadly similar to those in *BCD*.

b. In constant prices.

the sequences across columns but also the more or less simultaneous relationships among the indicators within each column: how stock prices are related to profits, materials prices to inventory investment, production to employment, sales to income, and so on. Finally, these studies have developed the reasons for and evidence underlying a relationship not explicitly shown in the table—a relationship that helps to explain why one business cycle tends to generate the next one.

This relationship has to do with the influence of the lagging indicators upon the subsequent movements of the leading indicators. An increase in the level of inventories, especially in relation to sales, if it proceeds far enough, is likely to cause buyers to cut back their orders. Here a lagging indicator, inventories, has an inverse effect upon a leading indicator, new orders. Similarly, a rapid increase in expenditures for new plant and equipment may, as output and capital utilization rates build up, result in a cutback in contracts for new plant construction. Likewise, an increase in interest rates on business loans may at some stage trigger decisions to reduce orders for machinery and equipment and to reduce the rate at which inventories of materials are accumulated. In short, there are feedback relationships running from the lagging indicators to the subsequent, opposite turns in the leading indicators. These relationships, too, have been documented empirically, as we shall see.

The hardest test for a theory or system of indicators to meet, as with any other economic theory or system, is one that requires it to perform on data that were not available when it was formulated. The U.S. indicators have experienced many such tests. One, covering twenty-five years and based on data not available when, in 1950, a set of indicators was selected and classified, is contained in Table 1-2.

The empirical evidence used to select and classify indicators in the 1950 study covered periods of varying length but ended in 1938. Twenty-one indicators were selected as the end-product of a study covering some 800 series. Eight of the twenty-one were classified as leading, eight coincident, and five lagging. Fifteen of the twenty-one are still shown currently in *Business Conditions Digest*, and close equivalents of the other six are also in that publication. From these twenty-one series in *BCD* we have constructed composite indexes, using a method developed in the late 1950s, and covering the period 1948 to 1975. The indexes have been adjusted for long-run trend, using a method developed in the 1970s. The turning points in the trend-adjusted series are compared in Table 1-2 with the peaks and

troughs in a chronology of growth cycles, a concept of the business cycle that has come into use in many countries only in recent years, which we shall discuss more fully below.

The test in Table 1-2, therefore, not only confronts the twenty-one indicators with data not available when they were chosen, but also with methods of analysis unavailable then. The results, recorded in the left-hand section of the table, show that the expected sequence among the three groups of indicators occurred at almost every turn throughout the period. The lagging indicators not only lag the growth cycle as expected but also lead the opposite turns in the leaders, which is also as expected and as demonstrated in 1950.

Even though the indicators selected in 1950 turned in a good record during the next twenty-five years, research on indicators and business cycles did not stand still. (Chapter 2 will discuss some of these changes in methodology.) In addition, the indicators themselves have improved. More of them are available in deflated form, more are published in seasonally adjusted form, some are available more promptly, there is better coverage of inventories and of price/cost relationships, and so on. In 1975 the Department of Commerce established a new list of indicators, and its record during the preceding twenty-five years is shown on the right-hand side of Table 1-2. The results are similar, on the whole, to those achieved by the 1950 list, partly because the content overlaps to a considerable extent. The user of indicators would, however, not hesitate a moment in opting for the 1975 list in view of its improved coverage of significant variables.

From this brief review of U.S. experience we contend that the conceptual framework underlying the indicator approach to business cycle forecasting has stood up well under repeated tests on subsequent data. Much room for error and uncertainty remains, as witness the uncertainty in 1982 over the prospects for recovery from the then current U.S. recession. But we know much more about the merits and limitations of the system than we did thirty years ago.

The study of foreign countries constitutes a further test of the Burns-Mitchell approach. If the results of our study reveal that the series that prove reliable both as leading and confirming indicators in the United States exhibit similar behavior in relation to cyclical turning points in other countries, this would confirm a fundamental theorem of Burns and Mitchell: namely, that their method of analysis is applicable to cycles in countries that organize their work mainly in business enterprises—not just the U.S. economy.

Table 1-2. Leads and Lags at Growth Cycle Peaks and Troughs: Two Sets of Trend-Adjusted Composite Indexes, 1948-75.

A. Lead (-) or Lag (+), in Months, at Growth Cycle Peaks

Growth Cycle Peak	*Indexes Based on 1950 List of Indicators*				*Indexes Based on 1975 List of Indicators*			
	Lagging, Inverted	*Leading*	*Coincident*	*Lagging*	*Lagging, Inverted*	*Leading*	*Coincident*	*Lagging*
July 1948	n.c.[a]	-6	+1	+1	n.c.	-6	-1	+1
Mar. 1951	-15	-2	-2	-1	-12	-7	-2	n.c.
Mar. 1953	-12	n.c.	+2	+3	n.c.	0	0	+6
Feb. 1957	-28	-17	0	+7	-22	-17	-14	+7
Feb. 1960	-17	-10	-9	+2	-15	-10	-8	+4
May 1962	-13	-5	-3	+5	-5	-3	n.c.	n.c.
June 1966	-19	-5	0	+3	n.c.	-3	+4	+7
Mar. 1969	-17	+2	0	+5	-17	-2	+7	+7
Mar. 1973	-9	-1	+17	+17	-13	-1	+8	+18
Mean	-16	-6	+1	+5	-14	-5	-1	+7
St. Dev.	6	6	7	5	6	5	7	5
Correlation with Leads in Leading Index	+0.76			+0.11	+0.64			+0.31

Table 1-2. continued

	B. Lead (-) or Lag (+), in Months, at Growth Cycle Troughs							
	Indexes Based on 1950 List of Indicators				*Indexes Based on 1975 List of Indicators*			
Growth Cycle Trough	*Lagging, Inverted*	*Leading*	*Coincident*	*Lagging*	*Lagging, Inverted*	*Leading*	*Coincident*	*Lagging*
Oct. 1949	-14	-4	0	+2	-14	-4	0	+5
July 1952	-17	n.c.	0	-4	n.c.	-8	0	n.c.
Aug. 1954	-14	-8	0	+2	-11	-7	0	+8
Apr. 1958	-7	0	0	+5	-7	-3	+1	+7
Feb. 1961	-10	-2	0	+2	-8	-2	0	+10
Oct. 1964	-24	-24	0	+1	n.c.	-28	n.c.	n.c.
Oct. 1967	-13	-10	0	0	-9	-8	-3	0
Nov. 1970	-15	-2	0	+19	-13	0	0	+15
Mar. 1975	-7	0	0	+20	-6	-1	0	+21
Mean	-13	-6	0	+5	-10	-7	0	+9
St. Dev.	5	8	0	8	3	8	1	7
Correlation with Leads in Leading Index	+0.89			+0.49	+0.09			+0.79

Note:
a. n.c. = no timing comparison.
Source: Geoffrey H. Moore, "The Forty-Second Anniversary of the Leading Indicators," in William Fellner, ed., *Contemporary Economic Problems, 1979*, American Enterprise Institute, 1980, pp. 428-29.

FROM CLASSICAL CYCLES TO GROWTH CYCLES

It is clearly a coincidence that the Great Depression occurred just before *Measuring Business Cycles* was completed (its publication was delayed by World War II) and that there has not been a depression of such severity since. While most postwar cycles have been milder and of a somewhat different character than the prewar cycles, even relatively severe ones have not disappeared. If the long expansion of the 1960s in the United States and favorable experience abroad led some to declare that the business cycle was obsolete, this was a euphoric view that was far from universally held, and it was all too soon refuted by the widespread contraction of 1973–75.[12]

While such contractions may be rare in the future, we now realize that to the NBER's previous emphasis on expansion and contraction in the absolute level of economic activity must be added efforts to account for changes in the rate of growth. Concern about growth rates has increased as our willingness to tolerate either high inflation or high unemployment has declined. Fortunately, growth cycles, as we shall see, give considerable evidence of being simply a variant within the same species of business fluctuations.

Ilse Mintz noted the significance of growth cycles in her study of postwar cycles in Germany.[13] She also focused attention at the National Bureau on applying the basic methodology for cyclical analysis to countries outside the United States. Her study therefore represented a major effort to date turning points in business cycles when the latter were defined and measured as upswings and downswings in the rate of growth ("growth cycles") rather than as expansions and contractions in levels of aggregate activity ("classical cycles"), the type of turning point typically found in the pre-World War II period. This distinction has come to the fore especially since World War II. Prior to that time there were, of course, many cyclical episodes in the United States, some severe, and some not so severe. But, in general, cyclical episodes were of sufficient severity that viewing a business cycle as a period of absolute expansion and absolute contraction in the level of aggregate economic activity made sense. Such a view of business cycles concentrates on what we now refer to as "classical cycles." For many years after World War II real growth tended to be fairly rapid in the United States, and even more rapid in many other industrialized market-oriented economies. More recently, the upsurge in inflation has produced even more spectacular growth rates in aggregate economic activity expressed in current prices.[14]

The result was that for long periods, by historical standards, there were no classical cycles. The decade of the 1960s was such a period in the United States, and the postwar period (through 1965) was such a period in West Germany. But Mintz found that if cycles were viewed not as periods of absolute expansion and decline in the level of activity, but rather as cyclical changes in the rate of growth, one could discern a good many more cycles, and they could be found during long periods characterized by the absence of classical cycles. These "growth cycles" are represented by deviations from a long-run trend that generally depicts long-term growth. Growth cycle turning points are related to, but are not the same as, turning points in classical cycles. One can, therefore, produce two business cycle chronologies for a given country, one depicting classical cycles and the other growth cycles. Classical cycles will generally show up in a growth cycle chronology, but all growth cycles will not appear in classical cycle chronologies.

The historical experience with dating business fluctuations at the National Bureau has been confined largely to classical cycles, although Burns and Mitchell's *Measuring Business Cycles* contained a chapter devoted to the effect of trend adjustment upon cyclical measures, thus anticipating the distinction between growth and classical cycles. The Mintz study of West German fluctuations in the postwar period and her subsequent study developing a growth cycle chronology for the United States represent significant efforts to apply the techniques developed previously for dating classical cycles to the kind of growth cycles typical of enterprise-oriented economies since World War II. In the next chapter we shall describe the technique as we have applied it to growth cycle analysis.

By concentrating on the dating of these "growth cycles," rather than on what we now call "classical cycles," the emphasis in this book is, therefore, placed on the kind of instability most typical of the market-oriented economies of the contemporary world. In this approach classical recessions (periods of negative growth) are regarded as part of the low-growth phases. While there are good reasons for concentrating here on growth cycles, the worldwide recessions in 1973–75 and 1979–81 showed clearly that classical cycles are by no means a thing of the past, regardless of whether or not growth cycles are the wave of the future.

PREVIOUS WORK ON INTERNATIONAL INDICATORS

Twenty years ago Julius Shiskin, writing on the possible uses of monthly reporting on the status of the indicators (an idea that came to fruition in the United States with the publication, beginning in 1961, of *Business Conditions Digest*), concluded:

> The indicator series and summary measures provide a sensitive and revealing picture of the ebb and flow of economic tides, which a skillful analyst of the economic, political, and international scene can use to improve his chances of making a good forecast of short-run economic trends. In summary, if one is aware of their limitations and alert to events in the world around him, the indicators do provide useful guideposts for taking stock of the economy and its needs.[15]

Indicators had always been viewed merely as one useful addition to the forecasting and diagnostic tools of business cycle specialists. Today the U.S. indicators are widely watched and followed, but we would still claim no more for them than Shiskin did. The possibility of developing them for a number of industrialized market-oriented economies, and reporting their status monthly, however, opens many new and potentially valuable avenues for further research and progress toward prompt diagnosis of international economic instability and inflationary pressures.

Before turning to an analysis of the indicator data provided by our work on the International Economic Indicator project, let us summarize what has been done in the years since Shiskin's judicious assessment of the prospect of improving our understanding of cyclical developments and forecasting ability by use of indicators (see Bibliography). We shall focus on work done for countries other than the United States.

One of the difficulties arising from such a review is the ambiguous nature of the term "indicator." Most countries now produce some publication concerning recent developments with regard to indicators. Almost invariably, however, the word simply refers to measures of aggregate economic activity or related economic data, which the publication reports on a current basis. This usage, of course, follows the long-standing practice of agencies such as the OECD, which for many years has published the principal series from the national accounts of member countries along with a group of other important time series (balance of payments, interest rates, exchange rates, price indexes, etc.) under the title *Main Economic Indicators.* Even where

the word "indicator" is not used, as in the United Nations' *Monthly Bulletin of Statistics*, the meaning is similar. Our usage is more restricted and refers to economic variables that are classified according to their cyclical behavior.

We have already noted Mintz's pioneering study of postwar German cycles.[16] This study was not only the first to focus on growth cycles rather than classical cycles, but was devoted particularly to developing roughly coincident indicators from which postwar Germany's growth cycle turning points could be selected. Mintz, however, did not deal with leading or lagging indicators. This gap is now being filled by the work reported here and by that of the IFO-Institute in Munich.[17]

Another early effort to compare internationally the behavior of cyclical indicators was Kathleen H. Moore's study of indicators in the United States, Canada, and Japan.[18] This work was aided enormously by the publication in the early 1970s (through the Japanese Economic Planning Agency) of a bi-monthly report called *Japanese Economic Indicators.* Also, the Canadian Department of Trade and Commerce has issued a similar monthly publication entitled *Current Economic Indicators.* These two reports were the only official ones at all comparable to the work with NBER-type indicators developed in the United States, until the Central Statistical Office in London began in 1975 to devote a section of their *Economic Trends* to British indicators of growth cycles.

Working with twenty-four U.S. leading, roughly coincident, and lagging indicators, and with twenty-eight Japanese and twenty-two Canadian equivalents to the U.S. list, Moore examined the timing relationships to discover whether the classifications found appropriate in the United States were also appropriate in the two foreign countries. This analysis enabled her to conclude, with some qualifications, that "... comparable series exhibit similar timing relationships in all three countries."[19] Utilizing summary indexes for each of the three groups of indicators in each country, she considered how regularly the leaders led the roughly coincident indicators, and how regularly the latter led the lagging indicators. Moreover, she considered whether the lagging index in each country was a reliable leader of the opposite turn in the leading index, a particularly valuable property associated with lagging indicators in the United States. For all three countries and considering the reference dates available at that time (roughly during the period 1948–61), she discovered that the expected sequences prevailed at fifty-eight out of sixty-five turning points (or close to 90% of the time). She found a perfect record

for the United States, four exceptions out of twenty-three for Japan, and three out of nineteen for Canada.[20]

In the early 1970s Desmond J. O'Dea concerned himself with the application of the indicator technique to the United Kingdom. Working at the National Institute of Economic and Social Research in London, O'Dea discussed with the authors the NBER approach to the study of indicators. (London was the base from which the essential underlying historical data for the international economic indicators project was collected during the year 1973-74.) While O'Dea was, therefore, aware of our basic approach, he chose to apply it to the recent U.K. experience only in a somewhat amended form. His first study was restricted to labor market indicators and compared their cyclical behavior in the United States and in Great Britain.[21] This study reflected his decision to view indicators more narrowly by examining specific kinds of series that might be expected to be reliable indicators for what he called target variables, in this instance unemployment. Thus, he used each target variable to provide a different set of reference dates, rather than develop a generalized set of reference dates as the NBER has customarily employed. O'Dea went on to expand his labor market indicators approach in this direction, and presented indicators of investment and production as well.[22]

O'Dea noted in the introduction to this work the extensive discussions he had had with the authors and with officials of the Central Statistical Office in London with a view to selecting a generalized reference chronology for the United Kingdom, but decided that the quest was futile. Recognizing the utility of a general reference chronology, he was nonetheless forced to conclude that "... it is not possible to construct a general cycle by detailed consideration of a selection of major economic variables, as in the National Bureau's approach...."[23] O'Dea argued, as indeed have others, that there were too many irregularities and special circumstances pertinent to the British experience since World War II to make a general method like that of the NBER feasible. The other participants in these discussions, nevertheless, have now produced growth cycle chronologies for postwar Britain. O'Dea indeed produced one in his 1975 book, only to reject it. Thus, instead of no chronologies for the United Kingdom, we now have several (see Chapter 2, especially Table 2-3).

Mention should also be made of the earliest experiments conducted by OECD with NBER-type indicators. Randolf Granzer's article, "Cyclical Indicators for Manufacturing Industries," utilized trend deviations for the Index of Industrial Production as the "reference cycle" in each country.[24] He then compared a small group of

leading indicators and a small group of lagging indicators to this growth cycle referrent. In general, his leading indicators, including results of surveys concerning orders or the ratio of orders to stocks, reflect the European emphasis since the 1950s on "qualitative indicators"—that is, on surveys of entrepreneurial judgment with respect to present and future conditions. (Our own work in this area is the subject of Chapter 5.) Granzer regarded his leaders as primarily "demand-oriented," while his lagging indicators were, in his view, "supply-oriented" (primarily investment and employment). The countries examined, for the decade 1963-1973, included Canada, the United States, Japan, Belgium, Denmark, France, Germany, Italy, Spain, Sweden, and the United Kingdom. The article reflected growing awareness in the OECD that leading, coincident, and lagging indicators can play a useful role both in cyclical analysis and in forecasting. Unfortunately, the findings were presented almost entirely in graphic form, with no summary measures of leading and lagging indicator behavior. Granzer's study represented, nonetheless, a highly useful step, and provided a welcome indication of the heightened interest in dating growth cycles and developing reliable indicators, both leading and lagging, in countries outside the United States.

From this modest first step, interest in monitoring growth cycles has increased greatly at the OECD. Almost from the outset of our efforts to construct a test of the feasibility of an international indicator system we have been in contact with officials at the OECD. Because they represent a well-established agency collecting and analyzing economic time series for many countries, they were an obvious focus of our attention. Accordingly, we initiated discussions that resulted in a continuing collaborative effort.

In 1978 the OECD established a working party on Cyclical Analysis and Leading Indicators, which held meetings at least once a year during the period 1978-1981, in which the authors participated. This effort resulted in the establishment of growth cycle chronologies for all of the twenty-four member countries. These chronologies were not all established on the same basis—some were primarily the work of national experts, others were developed by the secretariat. We have already noted that the working party decided early on that growth cycles should attempt to measure and track cycles in "output—broadly defined." Thus, the efforts at the OECD have diverged somewhat from those reported here. For example, they do not attempt a common set of indicators for the roughly coincident, much less for the leaders. Lagging indicators are planned but have not yet been developed in most cases. There is more or less common treat-

ment of time series, as all countries have or can get access to the basic computer programs developed at the National Bureau and utilized today at the Center for International Business Cycle Research.

The OECD working party no longer meets, but the work it commenced continues as part of the operation of the secretariat, which in turn is authorized to maintain contact with national experts. A recent report summarizes the activities of both the OECD and the member countries in this field.[25] A section in *Main Economic Indicators* also presents preliminary work on growth cycle indicators for member countries.

Outside the OECD interest in growth cycle indicators is increasing as well. At the European Economic Community a decision has been made to monitor growth cycle developments in those OECD countries that belong to the Common Market. No formal publications have emerged from the EEC, but several papers dealing with the analysis of growth cycles in member countries have been prepared for use by the EEC staff, and continuing contacts with the CIBCR are maintained as well.

PLAN OF THE BOOK

The findings reported in this book emerged from our work on international economic indicators launched at the National Bureau in August 1973 and continued at the Center for International Business Cycle Research.[26]

The initial questions prompting the present study can be summarized as follows: (1) Can business cycles be dated in other countries by means of the technique developed at the NBER for the United States? (2) Could the NBER approach as developed for classical cycles in the United States be adapted to the measurement and forecasting of growth cycles both in the United States and in other countries? That is, is the notion of a growth cycle a useful approach t the study of cyclical instability in a number of market-oriente economies, as Mintz's original work on postwar German cycles led one to expect? (3) Could the system of leading, roughly coincident, and lagging indicators developed at the NBER for classical cycles be effectively employed in the study of growth cycles both in the U.S. and elsewhere? These questions, in turn, lead to several related problems that must be explored. Could indicators of classical cycles behave with sufficient sensitivity to act as reliable indicators of growth cycles? Could the U.S. set of indicators be replicated for other countries? If so, do these indicators (or rough equivalents thereof) exhibit

comparable tendencies to lead or lag growth cycle turning points abroad? Assuming that growth cycle chronologies can indeed be developed for a number of countries, do they shed light on current problems such as: the way in which instability is transmitted internationally; the consilience among growth cycles in industrial economies and its relationship to the generation of inflationary booms or severe recessions; the comparative study of particular indicators—such as those related to the labor market—in different countries; and the study of the competitiveness of a particular country vis-à-vis its trading partners?

The chapters that follow provide the evidence we have uncovered in an attempt to deal with these questions. Overall, our findings support the validity of the indicator approach and encourage us to move forward in developing and improving this system both in the United States and in other industrialized economies.

Chapter 2 summarizes the methodology underlying the selection of growth cycle turning points and presents the growth cycle chronologies we have developed for the ten countries included in this study. These chronologies are based on substantially the same measures of economic activity for each country, covering output, employment, unemployment, real income, and real volume of trade. The growth cycle peak and trough dates represent the consensus among the turning points of these indicators after adjustment is made for long-run trend.

Chapter 3 provides an overview of the indicator system for each country by examining the summary measures of leading, roughly coincident, and lagging indicators. We then consider the composite indexes in each country, constructed from indicators classified according to U.S. experience, as well as the median timing of the groups of indicators.

The behavior of the individual indicators at growth cycle turning points for all ten countries is analyzed in Chapter 4. The result is a detailed test of the system, which has both scientific value and practical advantages. If individual indicators that have proved to lead or lag consistently in U.S. experience can be shown to have similar temporal relationships in other countries, the case for indicators—both in theory and in application to forecasting efforts—would be strengthened.

One possibility for improving the ability to forecast growth cycles with leading indicators, which is explored in Chapter 5, has involved the use of so-called qualitative indicators. Survey results dealing with what entrepreneurs think, for example, about their sales possibilities

are now regularly collected in many countries. Because of the popularity of these surveys abroad, their inclusion here is of considerable potential usefulness.

Chapter 6 considers the possibility of utilizing composite indexes for more than one country to study fluctuations in areas of the world such as Europe, or North America, or even the entire industrialized world. We find that this approach is useful in examining the degree to which business cycles in market-oriented economies have exhibited consilience in the years since World War II. Examining the evidence of a world cycle is also useful in studying the spread of general economic instability. The multicountry composite indexes used were constructed by weighting each country's index according to its 1970 GNP.

In Chapter 7 we consider the possibilities for forecasting trade flows by utilizing composite leading indexes that reflect economic conditions as they develop for any country's trading partners.

Chapter 8 examines another possible application of the indicator systems presented in this study: forecasting inflation-rate changes for market-oriented economies. The development of leading, coincident, and lagging indicators of inflation is an open field, and we need to sharpen our awareness of new inflationary trends, or disinflationary trends. What are the most reliable indicators for detecting these trends? Can available measures be improved? The preliminary results reported here have barely scratched the surface of this area of research.

Finally, Chapter 9 suggests some ideas for future studies that will be needed if the monitoring of international economic indicators is to play a useful role in helping us understand, predict, and ameliorate cyclical fluctuations.

NOTES TO CHAPTER 1

1. W. C. Mitchell, *Business Cycles* (Berkeley: University of California Press, 1913).
2. W. C. Mitchell, *Business Cycles, The Problem and Its Setting* (New York: NBER, 1927), p. 361.
3. A. F. Burns and W. C. Mitchell, *Measuring Business Cycles* (New York: NBER, 1946).
4. Ibid., p. 383.
5. W. C. Mitchell, *What Happens During Business Cycles* (New York: NBER, 1951), pp. 69 and 72.
6. Ibid., p. x.
7. R. A. Gordon, *Business Fluctuations* (New York: Harper & Row, 1961), 1st ed., p. 340.

8. Burns and Mitchell, *Measuring Business Cycles*, p. 4.

9. Tjalling Koopmans, "Measurement Without Theory," *Review of Economics and Statistics* (August 1947); Rutledge Vining, "Koopmans on the Choice of Variables to be Studied and of Methods of Measurement," *Review of Economics and Statistics* (May 1949); Reply by Koopmans and Rejoinder by Vining, *Review of Economics and Statistics* (May 1949). The entire exchange has been reprinted in American Economics Association *Readings in Business Cycles*, R. A. Gordon and L. R. Klein, eds., along with a significant Additional Comment by Koopmans. The Comment states that in the intervening years—that is, between 1949 (the year of the original review of the Burns-Mitchell book and the debate with Vining over the methodology it employed) and 1965 when the A.E.A. readings appeared—Koopmans had decided that the use of indicators and their development along the lines the NBER had pursued might produce "reasonably efficient summaries" of relevant information contained in time series. The change was, in a sense, a recognition of the degree to which National Bureau methods, at least for the United States, had become widely accepted and ceased to be controversial. The whole debate about whether or not the NBER was attempting "measurement without theory," carried on in the exchange between Koopmans and Vining, could have been avoided, or at least shortened, had it begun with a proper understanding of where Mitchell began. As we have noted, only after having considered all the extant theories, as well as attempting an analysis of the essential character of modern industrial economies, and a review of the history of business cycles in the United States, England, France, and Germany in the years up to 1913 did Mitchell conclude that to advance our knowledge of the subject "we must know the facts." With a firm grounding in theories previously expounded, Mitchell launched both his own inquiry (and ultimately that of the NBER) by declaring, "For an investigation upon any line we must provide such statistical data as these theories show to be required." (*Business Cycles* (Berkeley: University of California Press, 1913), p. 91. Part Three was reprinted in 1941 as *Business Cycles and Their Causes.*)

10. Gerhard Bry and Charlotte Boschan, *Cyclical Analysis of Time Series: Selected Procedures and Computer Programs* (New York: NBER, Technical Paper No. 20, 1971).

11. Since we began the study, the 1966 U.S. list has been revised once again. See U.S. Department of Commerce, *Business Conditions Digest* (May 1975 and November 1975). While our discussion in Chapter 2 includes comparison with the 1975 list, the emphasis is on the continuity between the 1966 list and the earlier lists. The differences between the 1966 and 1975 lists take one of two general forms. The first group consists of substitutes for series in the 1966 list that have been found to behave somewhat better for the United States than the older series. Some series with mixed behavior (i.e., behavior that is different at peaks than it is at troughs) have been excluded. Many of the substitutes from the 1966 list to the 1975 list reflect the improvement in data, and this has been a major reason for substitutions on successive revisions of indicators since the beginning. Thus, for example, the substitution of net change in inventories-on-hand and on-order for the change in book value, manufacturing, and trade inventories is made partly because the new series includes a sensitive component,

the change in unfilled orders. Other changes are for similar reasons. All this suggests, of course, that the generalizations reached in the earlier discussion concerning changes in the series continue more or less as valid for the most recent list. The fact that it is still related to classical rather than growth cycles should be borne in mind.

The other major kind of change reflects the impact of inflation, and so parallels a change, previously considered, that we have made in this analysis of growth cycles in the wake of the 1973–75 classical recession, even though at the outset we did not adjust for inflation. In the 1975 revision, following our own practice, all series in nominal terms have been deflated so that all indicators are in physical volume or in real terms. This enables us to differentiate inflationary from real factors in assessing ongoing economic developments. Earlier this might not have mattered so much, but increasingly, as inflationary rates have leaped upward, price effects must be explicitly accounted for.

12. See Geoffrey H. Moore's comment at a London conference organized in 1967 to discuss the question, "Is the Business Cycle Obsolete?" Said Moore, "The question posed by this conference may be obsolete, the problem of booms and recessions is not." (Cf. Martin Bronfenbrenner, ed., *Is the Business Cycle Obsolete?* (New York: Wiley-Interscience, Division of John Wiley and Sons, 1969), p. 40.

13. Ilse Mintz, *Dating Postwar Business Cycles: Methods and their Application to Western Germany, 1950–67* (New York: NBER, Occasional Paper No. 107, 1969).

14. One of the results of this upsurge is that we have altered our technique for measuring both classical and growth cycles to include deflating almost all the indicators expressed in price units. Thus, the Department of Commerce has deflated all indicators (with a couple of exceptions) on the 1975 short list, and we have instituted comparable deflation procedures since beginning our original study of international growth cycles in 1973. The impact of this deflation is discussed methodologically in Chapter 2 and in terms of its economic impact later in the book.

15. Julius Shiskin, *Signals of Recession and Recovery* (New York: NBER, Occasional Paper No. 77, 1961), pp. 113–14.

16. Ilse Mintz, *Dating Postwar Business Cycles.*

17. Cf. Werner H. Strigel, *Trade Cycle Indicators Derived from Qualitative Data* (CIRET Study 19, 1972, and references cited therein).

18. Kathleen H. Moore, "The Comparative Performance of Economic Indicators in the United States, Canada, and Japan," *Western Economic Journal* IX, no. 4 (December 1971).

19. Ibid., p. 420.

20. Ibid., p. 425.

21. Desmond J. O'Dea, "The Cyclical Timing of Labor Market Indicators in Great Britain and the United States," *Explorations in Economic Research* 2, no. 1 (Winter 1975): pp. 18–53.

22. Desmond J. O'Dea, *Cyclical Indicators for the Postwar British Economy*, National Institute of Economic and Social Research (Cambridge: Cambridge University Press, 1975). NBER researchers have also used reference cycle frame-

works derived from specific series. For example, Hultgren used railway ton-miles (*American Transportation in Prosperity and Depression*, NBER, 1948); Mintz used world imports (*Cyclical Fluctuations in the Exports of the United States since 1879*, NBER, 1967), and Michaely used the balance of payments (*Balance of Payments Adjustment Policies: Japan, Germany and the Netherlands*, NBER, 1968) for this purpose.

23. O'Dea, *Cyclical Indicators for the Postwar British Economy*, p. 21.

24. OECD Economic Outlook, *Occasional Studies* (December 1973): 23–55.

25. Cf. John Dryden, "The OECD System of Leading Indicators" (Paper delivered at the International Atlantic Economic Conference, Paris, March 11-19, 1983).

26. That an international economic indicator system could be useful was clear at least from 1977 when the Department of Commerce published in mimeographed form the first version of the present study—a monograph entitled *Monitoring Business Cycles at Home and Abroad*, which concentrated on developing leading, roughly coincident, and lagging indicators for the United States, Canada, Japan, the United Kingdom, and West Germany.