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*Chapter 9*

# TOWARD AN IMPROVED INTERNATIONAL SYSTEM OF BUSINESS CYCLE INDICATORS

Wesley Clair Mitchell published his first major work on business cycles in 1913 and he founded the National Bureau of Economic Research in 1920. For more than fifty years the bureau was the focus of research in the Mitchellian tradition, beginning with the publication of Willard Thorp's *Annals* in 1926 and continuing through a long list of major contributions to the measurement and analysis of economic instability. A significant step toward wide public use of these results was taken in 1961 when the Department of Commerce began publishing monthly a collection of the leading, coincident and lagging indicators selected by the National Bureau. The initiation of *Business Conditions Digest* (called *Business Cycle Developments* for the first seven years of its life) represented official recognition that whatever other techniques may be used in analyzing instability, the notion of reliable leading, coincident, and lagging indicators had been widely accepted as a diagnostic tool.

The initiation of the International Economic Indicators (IEI) project at the National Bureau in 1973 by Moore and Klein was in one sense an explicit extension of the Mitchellian indicator approach to the international economic scene and in another sense a return to the international perspective with which Mitchell began. The IEI project rested on two basic questions:

1.  Is the notion of a growth cycle a useful approach to the study of cyclical instability in a number of market-oriented economies?

That is, can growth cycle chronologies be established for them in a comparable manner?
2. Can rough equivalents for the U.S. leading and lagging indicators of classical cycles be found for other countries, and, if so, do they exhibit comparable tendencies to lead or lag at growth cycle turning points in those countries?

The overriding conclusion of the present study is that both of these questions can be answered in the affirmative. We began by adapting the National Bureau's computer program, which had been designed to date classical cycle turning points, to date the growth cycle turning points. Briefly, this adaptation involved taking deviations from a flexible (yet smooth) long-term trend in order to isolate short-run movements in the data. A list of computer-selected cyclical turning points in the principal measures of aggregate economic activity was then derived for each of the countries under study. After reviewing and occasionally modifying the results, we devised a growth cycle chronology for each country based on the consensus among these turning points. Just as the selection of business cycle reference dates has always been a crucial analytical step in the work on classical cycles, so, too, is the selection of appropriate growth cycle chronologies in growth cycle analysis.

One major decision we made in our work with indicators was to recognize explicitly the impact of generally higher inflation rates. Accordingly, all indicators that are measured in terms of value are deflated by a price index. This was not a common practice among business cycle analysts prior to the 1970s. Today we know of no growth cycle studies that do not work with series expressed in constant prices or in physical units so as to separate real from price phenomena.

We have thus far produced growth cycle chronologies for more than a dozen countries in the research program that is now conducted at the Center for International Business Cycle Research at Columbia University. In this book we have concentrated attention on the ten major industrialized market-oriented economies.[1] Some of the more interesting implications should now be summarized. In the United States, from 1948 to 1980, there have been ten growth cycles. Seven of them correspond to the seven classical cycles dated by the NBER (although the precise dates of peaks and troughs differ, as would be expected in series in which turning points are selected from trend-adjusted data). One of the additional three growth cycle episodes occurs at the time of the Korean War, and two in the 1960s. While the data are not adequate for a comparable period in all the other countries studied, it would appear that the United States has

continued to manifest a greater number of cyclical episodes (with correspondingly shorter duration) than most other countries.

Ten Canadian growth cycles can also be discerned in the period 1949-80; six U.K. growth cycles, 1950-75; six West German growth cycles, 1950-75; six Japanese growth cycles, 1953-80; four Belgian growth cycles, 1955-80; five French growth cycles, 1955-80; and five Italian growth cycles, 1955-81. The appearance of a classical cycle in all seven of these countries in 1973-75 and again in 1980-82 argues strongly for the continued monitoring of both classical and growth cycles despite the greater complexity that such a course will initially engender in research activities. Clearly, constructing growth cycle chronologies for countries other than the United States by adapting the Mitchell technique to growth cycle research can be regarded as eminently feasible.

An independent check on the usefulness of the growth cycle turning points can be performed by associating them with the leading and lagging indicators classified by their typical behavior at classical turning points in the United States. Admittedly, utilizing the short list of classical cycle indicators established for the U.S. in 1966 was an expedient, but it has proved to be an efficient way to test the feasibility of developing leading and lagging indicators of growth cycle turning points, in the United States as well as elsewhere.

Our findings with respect to these indicators may be summarized very simply. When the twenty-four U.S. indicators were recast in growth cycle terms they all retained their original timing classification. The leading indicators were as successful in anticipating growth cycles (including the three growth cycles that had no classical cycle counterpart) as they had been in anticipating classical cycles. There were occasional instances of both skipped and extra cycles, but certainly no more than has been the case in using these series as indicators of classical cycles.

With few exceptions the classification of indicators taken over from U.S. classical cycles is as valid for foreign growth cycles as it is for U.S. growth cycles. While some individual indicators are inappropriately related to individual growth turns (as has always been the case at classical cycle turns in the United States as well), in general, the exceptions are only slightly more frequent at foreign growth turns than they are at U.S. growth turns, and both are acceptably consistent with the U.S. classical cycle record. It is fair to add, however, that instances when the indicator system fails to produce the expected temporal pattern are more numerous for the smaller foreign countries included in the study (e.g., Belgium, the Netherlands, and Sweden). Whether this suggests that the indicator system is basically

less appropriate for smaller economies, or for economies more depen-
dent on foreign trade, is difficult to say. Certainly, much remains to
be done to improve the reliability of the indicator systems in all
countries. While the overall performance rate of the indicator system
in foreign economies is remarkably high, the areas where indicators
have not performed well constitute a major item for future research.
In addition, the lack of comparable data for particular indicators is
especially pronounced as soon as one moves beyond the five or six
largest and most industrialized economies. By demonstrating that
indicator systems are useful diagnostic additions to other techniques
of forecasting and cyclical analysis, we hope to spur the improve-
ment and availability of data in all economies where business cycles
continue to manifest themselves.

One searches with scant success for evidence that particular indi-
cators are consistently less reliable in one country than another. The
exceptions to expected patterns appear to be distributed more or less
randomly among indicators and across countries. The major excep-
tions among the leading indicators are as follows. In Italy, the typical
timing for the average workweek is a lag. Building permits lag in West
Germany and do not match growth cycles in Sweden. In the United
Kingdom and the Netherlands industrial materials prices lag, and in
Sweden the change in consumer credit lags. Among the roughly coin-
cident indicators, the poorest performer is retail sales, which leads by
more than three months in Japan, Italy, and Belgium, but lags by
more than three months in West Germany and Sweden. Employment
exhibits a clear-cut tendency to lag in France and to a lesser extent
in Italy, Sweden, and the United Kingdom. In sum, the behavior of
the six roughly coincident indicators is strongly supportive overall of
their U.S. classification. Among the lagging indicators, business loans
exhibit a median lead in West Germany, while short-term interest
rates show a short lead in the Netherlands.

This completes the list of indicators diverging from the expected
pattern. The average timing for each indicator, for all countries taken
together, shows the expected median timing, except in the case of
employment, which shows a two-month lag. In no case is the number
of countries in which an indicator fails to produce the expected aver-
age timing greater than three. Six of the twelve leaders, four of six
roughly coincident indicators, and three of the six laggers show no
countries diverging from the timing classification of these indicators
at U.S. classical cycles.

In short, one can locate examples of anomalous behavior, but such
behavior is no more prevalent among foreign countries than it has
typically been in the United States at classical cycle turns. Moreover,

these anomalies in indicator behavior appear to be randomly scattered. It is, of course, important to continue monitoring the record of growth cycle indicators both here and abroad, as indeed we have done for many years with indicators of classical turning points in the United States. We fully anticipate that the lists of indicators will be revised from time to time and that there will continue to be additions to and deletions from the list of "most reliable indicators." But there is no reason now to suppose that the basic classification of indicators is any less permanent or more ephemeral for foreign countries. In the United States structural changes and data improvements have accounted for substitutions in the list of indicators of classical turns far more often than changes in classification (which have, in fact, been extremely rare historically). Moreover, a major question that will need to be resolved in the future concerns the conflict between the virtues of maintaining a common list for all countries and the usefulness of obtaining the most sensitive and reliable list for forecasting in each country.

One of the more encouraging signs for the future analysis of international economic indicators has been the general acceptance among OECD countries of the feasibility of developing growth-cycle chronologies and indicator systems. The OECD has agreed to measure growth cycles in terms of "output—broadly defined" and to construct corresponding lists of indicators classified by timing. This effort has resulted in a good many national chronologies covering the postwar years. Indeed, the Secretariat has even attempted chronologies for those few OECD countries that have not produced a chronology of their own, with the result that—as we have already noted—growth cycle chronologies have proliferated in recent years.

The indicator system that we have developed is based primarily on "quantitative indicators." While "qualitative indicators" based on opinion surveys are not unknown in the United States, reliance has never been placed heavily on them because of the wealth of quantitative statistics. Nevertheless, qualitative measures often have considerable utility because of the greater promptness with which they become available and the greater smoothness survey net balances often exhibit in comparison to the equivalent quantitative series. One of our concerns in this book has centered on the usefulness of these qualitative indicators in cyclical analysis. We find that when the survey net balances are appropriately treated, the actual lead at turns is not as long, in many cases, as is the case with the comparable quantitative series. Augmenting the forecasting potential of quantitative indicators is not the only—or perhaps even the primary—function of qualitative indicators. In many situations one is interested in entre-

preneurial attitudes in and of themselves. This is surely a major purpose behind the harmonized surveys carried out by the European Economic Commission. We have concluded that while qualitative indicators can sometimes provide valuable evidence with which to diagnose cyclical developments, their advantages lie primarily in terms of the up-to-date information they contain.

In addition to constructing growth cycle chronologies and indicator systems, we have considered several possible extensions, and new applications of these indicators, for example, in the development of the concept of a world cycle. We found that from a composite index of all the roughly coincident indicators for all the countries under review we could identify a chronology of peaks and troughs that represented generally consilient cycles in all the countries. We also found that a composite of the leading indicators for all countries anticipated the turns in this world growth cycle chronology. Furthermore, the data suggest that no country can be termed a consistent initiator of world upswings or downswings.

If it is difficult to conclude that the sequence of cyclical changes runs invariably from any one or two countries to the other countries, it is still pertinent to inquire whether overall changes in international economic instability can be forecast by individual countries so as to predict changes in their imports or exports. We have tested this notion and conclude that cyclically sensitive trade flows can be forecast with the help of leading indicators. One test was based on U.S. trade with six other countries. We showed that exports are conditioned primarily by the stage of the growth cycle in the importing country or countries, with the result that any exporting nation can forecast its exports to any other country or group of countries for which a leading index is available.

We considered the implications of this finding not only for U.S. exports but for imports as well. And we examined the possibilities of forecasting total manufacturing exports by the United States to the other countries and summarized the results for a number of individual commodities as well. Because the countries we examined comprised nearly half of total U.S. export demand, the results were moderately encouraging regarding the use of leading indexes to forecast total U.S. exports.

We then reversed the process and found that British exports of manufactured goods, as well as those of West Germany, Japan, and all the less-developed countries could be reasonably well forecast with changes in the leading index for the six major countries, which together absorb a large percentage of the world's imports. Increased availability of leading indexes for other countries will likely yield

significant dividends in the form of greater accuracy in forecasting trade flows. The method can be adapted to take account of changes in exchange rates and to forecast changes in trade balances.

Finally, we explored very briefly the possibilities of forecasting changes in inflation rates by means of leading indicators. This exercise provided a cogent example of the critical relationships among business cycle theory, measurement, and analysis. Because inflation has become a problem endemic to many market-oriented economies, it was necessary for us to deflate price-denominated indicators so as to separate real from inflation rate fluctuations. But it is nevertheless true that both kinds of fluctuations emerge from the interaction of supply and demand pressures. It is the sequential logic of these inter-relationships that forms the rationale for the leading, roughly coincident, and lagging indicators.

This is not to argue in support of the proposition that inflation is a real rather than a monetary phenomenon—it is perhaps more accurate to say that real and monetary phenomena are themselves inter-related and the behavior of the indicators is related to both, even if the effects are best viewed separately. Our examination of the behavior of industrial materials prices (an early indicator of changing inflation rates) and consumer prices (used to measure inflation rates) within the growth cycle chronologies suggested that the view taken here of the relationship between inflation and growth cycle indicators is both reliable and useful. As such, it suggests yet another area in which cycle indicators could contribute to forecasting efforts.

## MEASUREMENT AND THEORY: THE APPROPRIATE MIX

Some readers may feel that the evidence we have presented is so convincing, or so close to what they expected, that our findings almost speak for themselves. Nevertheless, to us it has seemed necessary to present all the initial evidence for each of the countries considered. This approach, analyzing each series and each turning point for which evidence can be found, has been the traditional approach taken by Mitchell and his followers.

Other readers may feel that our detailed display of evidence signifies nothing, because it is not placed explicitly in the context of a complete theory or model of the business cycle with all of the international implications spelled out. Without such a theory, some may claim, we do not really know how the system works, how parts fit the whole, or how confident one can be that these relations will persist. This debate was discussed in considerable detail in Chapter 1.

Clearly, there is merit in developing a detailed explanatory system. We take the view, however, that useful results can be achieved without it—useful in the sense that partial results are understandable or explainable and capable of being tested against future data or data for other economies. Moreover, such partial results may have other advantages. They can be reached more quickly and hence provide useful information at an earlier date, and they can be comprehended more readily by a larger group of potential users. The leading indicators we now possess, for example, are easier to understand than some other current approaches to forecasting. The idea that new orders for goods contain useful information about future sales, output, employment, and income is not difficult to comprehend, and not difficult to observe in the data.[2] Consequently, this idea was being used by forecasters for many years before it was incorporated into econometric models. In fact, the development and improvement of new-orders data was one of the recommendations in Burns and Mitchell's original study of 1938.[3]

Although we have not organized our work on indicators around the concept of a large-scale international economic model, this does not mean that partial theories or explanations have not played an important role. Without them one would have little or no confidence that past relationships would persist or be applicable elsewhere. Partial theories have always been a part of Mitchellian business cycle research. For every indicator we have had a hypothesis (or several hypotheses) explaining its behavior. Many reports outlining and testing these hypotheses have been published over the years. Moreover, the tests have frequently been replicated using new data. The successive studies of indicators (Mitchell and Burns in 1938, Moore in 1950 and 1960, Moore and Shiskin in 1967, and Zarnowitz and Boschan in 1975) are such a series of replications. Stanback's work on inventories (1962) replicated that of Abramovitz (1950); Kessel's (1965) and Cagan's (1966) work on interest rates replicated that of Macaulay (1938); Klein's work on consumer credit (1971) replicated that of Haberler (1942); and Hultgren's work on costs and profits (1965) replicated that of Mitchell (1913).[4] Of course, each author added some new hypothesis or revised or expanded an old one, and all had more data against which to test their hypotheses.

## CLASSICAL CYCLES AND GROWTH CYCLES

If the publication of *Business Conditions Digest* can be viewed as the official demise of the debate over the appropriateness and usefulness

of the NBER technique in studying classical business cycles, it was ironically followed by another debate—premature, as it turned out—concerning the possible obsolescence of the classical business cycle. Some have argued, of course, that growth cycles merely represent a newer form of the classical cycles measured for the United States, Britain, France, and Germany. It is worth remembering, though, how rapidly one's perspective can change, and how dangerous it is to allow a fundamental perspective to be altered by short-lived events. In the 1960s and early '70s, prior to the severe recession of 1973-75, there was not only little real concern about business cycles in foreign countries (let alone the possibility of world cycles), but not much concern with cycles in the United States either. One of those who was concerned was Ilse Mintz, who saw the potential value of a new attempt to measure growth cycles,[5] and she reported her work on this very topic at the Fiftieth Anniversary colloquium held at the National Bureau in 1970. In this connection Paul Samuelson commented:

> Now that the National Bureau is fifty years old, it has worked itself out of one of its first jobs, namely the business cycle. I don't know when the American Cancer Society was founded, but by similar reasoning fifty years after that date some optimist could hope to cross cancer off his list. The Bureau was thus in danger of becoming just a museum of fossils; but nobody likes to work himself out of a job, so you naturally redefined the field to study. I predicted some time ago that this would happen, and Ilse Mintz . . . has confirmed my prediction.[6]

No doubt Samuelson would agree that this view, expressed in 1970, was premature, and that the appearance four years later and again eight years after that of relatively severe, classical recessions might justify continued attention to business cycle research. Today the preoccupation of the National Bureau of Economic Research with both classical cycle and the growth cycle analysis is continued at the Center for International Business Cycle Research at Columbia University.

Erik Lundberg has written:

> History never repeats itself in exactly the same way. There are such important differences between the catastrophic United States depression of 1929-33 and the mild recessions of 1926-27 and 1960-61 that from some points of view they can well be classified in different categories. But if we assume there is empirical evidence to make it sensible to talk about the United States experience with cyclical instability over the period 1919-64 as a tolerably homogeneous set of phenomena, what about, for instance, British, Dutch, or Swedish economic developments during the

same period? Or similar experiences in Japan, Australia, or South American countries? Do we have empirical evidence permitting us to classify the instability experiences of these countries in the same category?[7]

Consideration of the issues raised in this passage by Lundberg is radically different if approached from the context of our work on growth cycle measurement. To begin with, the important differences in various U.S. cycles referred to earlier are now seen as related cyclical episodes even though of varying severity. The reliability of traditional indicators in relation to growth cycles suggests that *all* cycles, whether classical or growth, have much in common. Cycles may then be viewed as occupying a continuum from most to least severe, and that as classical cycles become less pronounced it becomes increasingly necessary to measure them as growth cycles. Their commonality is certainly underscored by the consistency with which indicators of one type of cycle can be fruitfully applied to the analysis of the other.

Concerning the question of whether the "tolerably homogeneous set of phenomena" of U.S. economic experience is or is not the same as that found in foreign countries, we can clearly advance an answer if we utilize the evidence developed in the preceding chapters. The fact that the same methodology can be adapted with considerable success to dating growth cycles in foreign countries and that rough equivalents of U.S. classical cycle indicators bear reasonably consistent temporal relationships to growth cycle turning points both in the United States and in each of the other countries thus far tested is just the sort of evidence that Lundberg called for. Indirectly, too, an answer is suggested by the fact that the methodology is being used by international organizations such as the OECD and EEC as well as by statistical agencies, central banks, and research institutes in different countries on every continent.

Far from becoming fossils, therefore, cycles are simply being viewed as phenomena sufficiently alike to justify isolation for purposes of analysis, but subject nonetheless to an endless series of changes and variations as they appear sequentially through the economic history of each of the economies in which they appear. Moreover, the term "fossil" connotes antiquated persons or things. If antiquated means dead as well as old then it cannot possibly apply to the growth cycle manifestation of the historic instability of market-oriented economies. Cycles are old, but unhappily even classical cycles are far from dead.

## AGENDA FOR THE FUTURE

We believe the work reported in this volume can open many doors for those who wish to gain an understanding of economic instability and inflation in the modern world. The potential for further analysis and ongoing research has been increased considerably by the introduction of the growth cycle concept, by the development of a widely applicable methodology for constructing growth cycle chronologies, and by the identification of reasonably consistent leading and lagging indicators of these growth cycle turning points in the major industrialized economies dealt with in this book.

The computer programs developed originally at the National Bureau and later revised at the Center for International Business Cycle Research are available to all who request them. By exporting the methodology we hope to facilitate both the research process and its practical application throughout the industrialized world. Continued research is needed on such questions as how instability is transmitted from one country to another, whether it can be said to find its genesis more often in one country or countries than in others, how and why countries find that their economic fortunes are tied more surely or with greater impact to certain other countries, how these matters affect trade, financial markets, and prices, and how they are affected by economic policies.

A further possible extension of this work—only touched on in our earlier discussion—is to apply the analysis to the exports of developing countries, insofar as their exports flow to the industrialized countries for which we have leading indicators. The countries we have already covered import a substantial share of products from developing nations, and demand for such imports fluctuates with the rise and fall of growth cycles. The leading indicators for the countries analyzed above, to say nothing of those we hope will ultimately be constructed, could be of considerable value to the developing nations in appraising their markets.

There is scarcely an organization engaged in economic research today that is not deeply involved in studying the causes and consequences of inflation. At the Columbia Center, for example, the application of the leading indicator approach to forecasting inflation is being actively extended and has already attracted wide interest. Since there appears to be a clear sequence of changes involving the financial, commodity, and labor markets that are ultimately reflected in the rate of inflation in consumer prices, this sequence has enabled us to construct a leading index of inflation for the United States and to

explore its capacity to forecast inflation.[8] In addition, we have studied the possible extension of this method to other countries.[9] We believe that continued work on inflation indicators can, in short, play a role in the worldwide effort to understand the inflation process better and thus control it more effectively.

Another area at the frontier of indicator analysis concerns its application to forecasting employment conditions. At the Columbia Center a new U.S. index has been constructed based on those leading indicators directly pertinent to employment or unemployment (the average workweek in manufacturing, overtime hours in manufacturing, initial claims for unemployment insurance, short-duration unemployment, and a measure of changes in part-time employment due to slack demand for employees). The index appears to yield useful forecasts of changes in unemployment and might well be developed for other countries.

The sequential relationships among groups of indicators is also leading to the development of objective "signals" of forthcoming changes, based upon the composite leading and coincident indexes. These indexes each contain what is called a "target trend," which is the long-run trend in the economy since 1948. The target trend adjustment standardizes the trends so that both indexes have a trend equal to the long-run rate for the economy. Differences among the indexes observable at any particular time must be due to short-run factors. When, therefore, the six-month smoothed rate of change in any given index is less than the target trend rate, it is rising at a rate below its long-run rate of growth, and presages a growth recession. The signals that have been developed so far involve sequential changes in both leading and coincident indexes and provide early warnings and subsequent confirmation. These relationships obviously are derived from typical behavior of the indexes during a number of previous recessions. Though originally devised to improve the efficacy of countercyclical public-works programs, the possibilities in this approach are broad.[10]

In the United States the effort to bring the experience of past growth recessions and recoveries to bear in forecasting future developments has resulted in a periodic report of the Columbia Center called "Recession-Recovery Watch." The publication tracks monthly changes in the composite indexes, as well as in many individual indicators, against their average behavior in previous business cycles over comparable intervals after the last peak or trough. In this way current developments can be assessed in the light of past experience. While this approach appears promising in improving our ability to monitor ongoing growth cycle developments, it has not yet been

explored to any great extent for other economies. The thrust of much that has been reported in these pages suggests that this particular line of inquiry might be a promising path to pursue.

In determining whether and to what degree economic fluctuations in industrial market-oriented countries may have widened in scope and become more nearly synchronized, data on new orders for goods, formation of business enterprises, contracts for industrial and commercial construction, housing starts, inventory investment, price/cost ratios, and other domestically sensitive measures of economic change should be particularly instructive, in part because they have seldom, if ever, been examined from this point of view. At the same time, it would be essential to examine the more internationally sensitive measures, such as industrial materials prices, security prices, interest rates, and foreign trade. Conceivably, the internationally sensitive variables may have become less stable at the same time that the domestically oriented variables have become more stable, as indeed Mintz showed for U.S. exports.[11]

Closely related to this type of analysis would be comparative international studies of particular economic processes such as inventory accumulation; credit, the money supply, and interest rates; orders, production, and investment; consumption and income; and so on. The NBER has studied these processes and others for the United States over many years, but only occasionally on an international scale. With new data and new methods these studies could be extended to other countries. One example is provided by Desmond O'Dea's analysis of the behavior of labor market indicators in postwar Britain.[12] Our preliminary work has already suggested that certain economic variables, such as those pertaining to employment, or the housing market, or to foreign trade, may not be related to one another in precisely the same way in every country. For example, it is evident that in many countries housing starts are highly sensitive to cyclical fluctuations, and it is generally believed that monetary policy has a large impact upon this industry. But in Japan housing starts are relatively stable, though still performing as a leading indicator. What is the source of this immunity and what implications does it have for economic policy? In Sweden we saw that the turns in housing starts could not even be related to the growth cycle chronology. The explanation there lay in the highly regulated nature of the housing industry. Whatever the explanations for anomalous behavior may be, the indicator data we have assembled, supplemented by related data, ought to facilitate a number of comparative studies of this type.

One of the products of the IEI project is a methodology for measuring long-run trends. The method is flexible enough to reveal chang-

ing long-term rates of growth quite promptly, yet is little affected by the short-run cyclical movements that have been our primary concern. Trend rates of growth are derived for every indicator, and can be brought up to date every few years without extensive revision of results for earlier years. A method of extrapolation to future years has been built into the program, although we have not tested it extensively. If business cycles—whether classical or growth cycles—are part of a long-run process best regarded as growth at irregular rates, it follows that the study of what determines underlying growth rates ought to contribute to the understanding of economic instability and vice versa. In this connection, therefore, the trend measures that we derived as part of our study of growth cycles for every series ought to open up a wealth of material that could be the focus in studies of economic growth, of productivity and costs, of capital investment, of market shares and competitiveness, and of inflationary trends.

In order to make the indicator data promptly and widely available on a current basis, in original as well as trend-adjusted form, together with trend rates of growth, composite indexes, and other analytical measures described and illustrated earlier, an international data bank is essential. Major steps in this direction have already been taken. It is technically feasible for such a data bank to be supplied daily with new data from a network of computers in the countries producing the data and at the same time to make the analytical products of the data bank accessible through computer terminals to users of the data. This is, in fact, the way in which several data banks operate, including what was formerly the National Bureau's data bank of U.S. economic time series. In this instance the indicators are updated each day, and companies, universities, and government agencies obtain the data either through a time-sharing system or by purchasing magnetic tapes updated monthly.

We have earlier indicated that the computer programs developed in the course of the work reported on in this book have been made available to the OECD, the EEC, to a number of government agencies, as well as to private research organizations. The Columbia Center now issues a monthly report on the standing of the indicators in major countries, and the Conference Board circulates a summary report to its member companies. In this effort we have had the cooperation of the OECD, as well as several government agencies both in the U.S. and in other countries. But much needs to be done to improve the timeliness and accuracy of the data transmitted, as well as to expand its coverage internationally. As a reporting system of

this kind develops, not only will the countries involved be encouraged to improve the quality, comparability, and timeliness of their statistics, but the resulting international exchange of data and research findings will greatly enhance our understanding of the causes and consequences of international economic fluctuations.

## NOTES TO CHAPTER 9

1. At the Center, in addition to the ten countries considered here, visiting scholars have developed growth cycle chronologies for Switzerland, Australia, South Korea, Taiwan, Malaysia, Israel, Venezuela and South Africa. Several of these are shown in Appendix 2B.

2. Compare Victor Zarnowitz, *Orders, Production and Investment: A Cyclical and Structural Analysis*, Studies in Capital Formation No. 22 (New York: NBER, 1973).

3. The wording of their recommendation is of some interest in the present context:

> Perhaps the most promising thing that might be done along these lines is to start with the hypothesis that the new orders placed today will be the output of tomorrow, and that a forecasting index might therefore be made by combining reports on orders in many lines of business, including contracts for construction. In analyzing time series we have found the rough rule to hold, that orders for commodities and construction contracts make cyclical upturns and downturns before corresponding reference dates for revivals and recessions. . . . But it should be noticed that a good index of orders is likely to prove a better forecaster of business cycle recessions than of business cycle revivals (*Statistical Indicators of Cyclical Revivals* [NBER, 1938], pp. 11-12).

The index Burns and Mitchell suggested was compiled by Zarnowitz in 1973 (*Orders, Production and Investment*, p. 629-32) and has been one of the twelve leading indicators in the Commerce Department's list since 1975. The "rough rule" has held consistently at business cycle peaks and troughs ever since 1948, and the leads at peaks have, as anticipated, been consistently longer than at troughs. The "hypothesis" has proved useful, despite its apparent simplicity.

4. Moses Abramowitz, *Inventories and Business Cycles, with Special Reference to Manufacturers* (New York: NBER, 1950); Phillip Cagan, "Changes in the Cyclical Behavior of Interest Rates," *Review of Economics and Statistics* (August 1966), Reprinted as Occasional Paper 100, New York, NBER; Gottfried Haberler, *Consumer Installment Credit and Economic Fluctuations* (New York: NBER, 1942); Thor Hultgren, *Cost, Prices, and Profits; Their Cyclical Relations*, NBER Studies in Business Cycles 14, 1965; Reuben A. Kessel, "The Cyclical Behavior of the Term Structure of Interest Rates," NBER Occasional Paper 91, 1965; Philip A. Klein, *The Cyclical Timing of Consumer Credit, 1920-67* (New York: NBER, 1971); Frederick R. Macaulay, "Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields, and Stock Prices in the United States Since 1856" (New York: NBER, 1938); Wesley C. Mitchell, *Busi-*

*ness Cycles* (Berkeley: University of California Press, 1913); Wesley C. Mitchell and Arthur F. Burns, *Statistical Indicators of Cyclical Revivals*, Bulletin 69 (New York: NBER, May 28, 1938); Geoffrey H. Moore, "Statistical Indicators of Cyclical Revivals and Recessions," NBER Occasional Paper 31, 1950. Reprinted in *Studies in Business Cycles* 10. Also reprinted in *Business Cycle Indicators*, vol. 1, G.H. Moore, ed. (New York: NBER, 1960); Geoffrey H. Moore, "Leading and Confirming Indicators of General Business Changes," in *Business Cycle Indicators*, vol. 1, G.H. Moore, ed. Princeton University Press for National Bureau of Economic Research, 1961; Geoffrey H. Moore and Julius Shiskin, *Indicators of Business Expansions and Contractions*, NBER Occasional Paper 103, 1967; Thomas M. Stanback, *Postwar Cycles in Manufacturers' Inventories* (New York: NBER, 1962); Victor Zarnowitz and Charlotte Boschan, "Cyclical Indicators: An Evaluation and New Leading Indexes." U.S. Department of Commerce, *Business Conditions Digest* (May 1, 1975). Reprinted in *Handbook of Cyclical Indicators* (BCD, 1977): 170–184; Victor Zarnowitz and Charlotte Boschan, "New Composite Indexes of Coincident and Lagging Indicators" (BCD, November 1975). Reprinted in *Handbook of Cyclical Indicators* (BCD, 1977): 185–199.

5. Another early National Bureau effort in the direction later taken by growth cycle research is Ruth P. Mack's work on "sub-cycles." See, for example, *Consumption and Business Fluctuations, A Case Study of the Shoe, Leather, Hide Sequence* (New York: NBER, 1956).

6. Paul Samuelson, Discussion in Victor Zarnowitz, ed., *The Business Cycle Today*, Fiftieth Anniversary colloquium, I (New York: NBER, 1972), p. 167.

7. Erik Lundberg, *Instability and Economic Growth* (New Haven: Yale University Press, 1968), p. 7.

8. Geoffrey H. Moore and Stanley Kaish, "A New Inflation Barometer," *The Morgan Guaranty Survey* (New York: Morgan Guaranty Trust Company, July 1983, pp. 7-10, and December 1983, pp. 7-10) for the development of the U.S. inflation indicator.

9. A report by Philip A. Klein, prepared for the London Conference of the International Conference of Forecasters in July 1984, extended the Moore–Kaish approach to most of the other major countries covered in this book.

10. See Victor Zarnowitz and Geoffrey H. Moore, "Sequential Signals of Recession and Recovery," *Journal of Business* (January 1982). Reprinted in Geoffrey H. Moore, *Business Cycles, Inflation, and Forecasting*, Ballinger, 1983, Chapter 4.

11. Ilse Mintz, *Cyclical Fluctuations in the Exports of the United States since 1879* (New York: NBER, 1967).

12. Desmond J. O'Dea, "The Cyclical Timing of Labor Market Indicators in Great Britain and the United States," *Explorations in Economic Research* (Winter 1975).