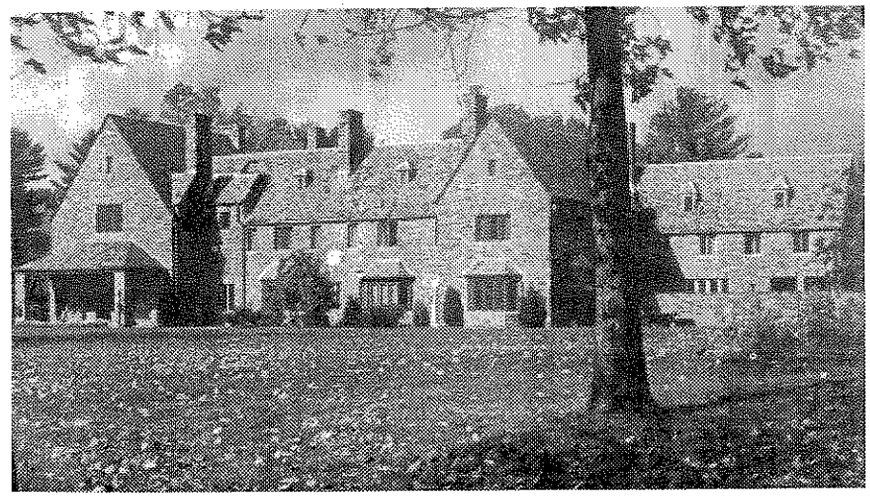
Economic Education Bulletin

AMERICAN INSTITUTE FOR ECONOMIC RESEARCH
Great Barrington, Massachusetts 01230

Second class postage paid at
Great Barrington, Massachusetts

Forecasting Business Trends

By
The Editorial Staff



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Published by
American Institute *for* Economic Research
Great Barrington, Massachusetts

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ECONOMIC EDUCATION BULLETIN

Vol. XL No. 12 December 2000

ISBN 0-913610-16-X

Economic Education Bulletin (ISSN 0424–2769) (USPS 167–360) is published once a month at Great Barrington, Massachusetts, by American Institute for Economic Research, a scientific and educational organization with no stockholders, chartered under Chapter 180 of the General Laws of Massachusetts. Periodical postage paid at Great Barrington, Massachusetts. Printed in the United States of America. Subscription: $25 per year. POSTMASTER: Send address changes to *Economic Education Bulletin*, American Institute for Economic Research, Great Barrington, Massachusetts 01230.

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INTRODUCTION

FOR over 60 years we have inquired into the economic phenomenon referred to as the "business cycle." Despite extensive media coverage and close scrutiny by economists, business (or economic) cycles seem to be one of the least understood phenomena. This volume is not intended to explain why cycles occur,* but to acquaint readers with an analytic system for measuring and forecasting business-cycle changes using statistical indicators. An understanding of this approach aids in the understanding of the economic process itself and of the wisdom, or lack thereof, of various economic policies.

We begin with a characterization of business cycles. Business cycles are recurrent phases of expansion and contraction of business activity. Historical data indicate that, in any industrialized economic system based on individual ownership of property and mostly unfettered markets, business activity does not occur at a constant rate,† but occurs with cycles of prosperity, crisis, recession or depression, revival from the recession, and finally prosperity again. (These four phases may be consolidated into two — expansion and contraction.) There are no beginning or ending points, only continuous cycles. Although business cycles are recurrent, both the duration and magnitude of cycles vary greatly. No two business cycles are exactly alike.

Different aspects of business activity, such as production, employment, prices, and interest rates have been measured, charted, and analyzed at different times. Through the analysis of current data and comparison with previous data, the particular phase of the business cycle can be roughly ascertained. Because of the time involved in collecting and interpreting the data, identification of the phase of the business cycle at any particular time necessarily is done after the fact. Although this type of analysis is useful for the study of key economic relationships, the ability to forecast correctly the future trend of business activity is more important in the business world. That achievement remains quite elusive.

As the economy has evolved into more complex processes of production, distribution, and exchange, more accurate forecasts of the future trend of general business activity have taken on increased importance. In the agricultural economy of the 19th century, the number of business transactions was relatively small, and people usually bought and sold goods within

* For our finding on this question, see "Cause and Control of the Business Cycle," by E. C. Harwood, the Institute's *Economic Education Bulletin* for September 1974. Price: $6.

† Some analysts have concluded that this also was evident in "command" economies of communist regimes, but the data published by those governments generally are unreliable.

their own small communities. Consequently, they were not so concerned with the volume of business transactions in other parts of the country or world; thus, accurate forecasts were less critical.

In the highly industrialized economy of the 21st century, however, business transactions occur on an enormous scale across state and national borders, continents, and oceans. Modern transportation and communication technology make possible the distribution of products and services far distant from their points of origin. Today, the knowledge of economic developments in every part of the country (and often the world) is a business necessity for firms of even moderate size. Moreover, many businessmen need to know what is happening in many sectors of the economy. For more successful management, they must be able to ascertain what effects various developments will have on their operations and products *before* their endeavors are affected. Many millions of dollars easily could be lost because of a business manager's incorrect appraisal of the future trend of general business activity.

The topics explored in the pages that follow may shed some light on this important question of business cycles and how to forecast them.

I.

ECONOMIC FORECASTS

What is Economic Forecasting?

AN economic forecast is an assertion about probable future events or levels of various types of economic activities. Stated more formally, forecasting is a process of systematically identifying and assessing the status of key economic aspects that are useful for predicting some future economic event. "Systematic" refers to a replicable procedure; it excludes predictions based on "intuition" or other procedures that cannot be employed by others. The more that pertinent aspects of economic activity and all their connections can be ascertained, the more accurate forecasts are likely to be. In spite of the way economic forecasts are portrayed as being highly refined and accurate, that they usually are far off the mark from actual events attests to the limited understanding by economists of key economic relationships and their significance for future events. Plainly, a better understanding of the factors constituting business cycles is necessary if forecasting is to be more accurate and thus more useful.

Who Uses Forecasts?

Forecasts are not end products, but can be a useful element of economic decision making. A variety of individuals and groups in various organizational settings use economic forecasts for their own decision making, some in a narrow way and others in a rather broad way. For example, an entrepreneur probably is most interested in forecasts of the specific economic events that influence his particular industry and product or service within that industry. Investment counselors and government officials, on the other hand, may be more interested in forecasts of economic aggregates at the national or international level. Regardless of particular interests, the members of both groups rely on *some* means of assessing probable future economic conditions in making appropriate decisions.

Were a business manager to have accurate knowledge of such things as future price levels for raw and component materials, the future level of consumer demand for his goods, and future wage rates for his employees, his ability to make profitable business decisions would be greatly enhanced. Lacking a crystal ball, however, he must rely upon predictions of future economic conditions in those areas most affecting his operations. Countless decisions about production, inventories, prices, or employment are made daily on the basis of estimates of what will happen sometime in the future. There appears to be no way of avoiding such estimates. The object of forecasting is to make these estimates as accurate as possible and,

therefore, to aid in the selection of alternatives that bring the desired outcome.

Because the profitability of business firms is greatly affected by estimates of future conditions, many large corporations now have in-house economic research departments that provide managers with forecasts about those economic aspects of importance to the firm. Managers of smaller firms often buy their forecasts by subscribing to the economic services or publications of a large bank, insurance company, brokerage firm, or economic consulting firm. The economic predictions of Government officials and agencies also are widely available.

Many Federal Government agencies, including, among others, the Office of Management and Budget (OMB), the Department of Commerce (DOC), the Department of the Treasury, the Board of Governors of the Federal Reserve System, and the Congressional Budget Office (CBO), have large economic staffs and issue their own forecasts on a continuing basis. The Council of Economic Advisers (CEA), whose main duty is to analyze the national economy and its various segments and advise the President on economic developments, also issues an annual forecast. In addition, its three members often publicly announce their predictions regarding economic events. Because the Government has become a major factor in the economy and because elected officials have concluded that the Government is responsible for and capable of "assuring" specific economic performance, these forecasts have had an increasing impact on the U.S. economy.

Economic forecasts evidently were directly and indirectly responsible for specific Government actions in many instances. For example, President Reagan's much-debated "Program for Economic Recovery" was based on a forecast that America's future would be dark if previous policies were continued. A larger Government presence in the economy, more rapidly rising prices, stagnating productivity, and higher unemployment were some of the more serious problems foreseen. Changes in policy therefore were prescribed in order to avoid the predicted problems. Ironically, perhaps, the continued growth of Government in the face of such forecasts may be indirectly attributable in part to other forecasts: namely, the perennially "rosy" predictions of GDP growth issued by OMB economists that are used in the annual budget process to justify continuation and expansion of Government spending.

Forecasts that affect some decisions may also affect the accuracy of the forecast. Government policymakers use forecasts of what business firms plan in order to determine the role that Government should play. Likewise, businessmen use forecasts of the effects of Government policies to make

their business decisions. However, if Government officials change policies on the basis of forecasts of business plans, the forecasts of Government policies used by businessmen will be erroneous, and vice versa.

The predictive accuracy of forecasts may suffer from another, nontechnical flaw. Aware that forecasts might be self-fulfilling (that is, a forecast of an impending recovery [or contraction] might foster behavior that would result in a recovery [or contraction] if believed by enough persons), some analysts may make intentionally false forecasts. We suspect this often is done by Government spokespersons. Such forecasts are indistinguishable from those made without an ulterior motive. In time, one might suppose that people would learn about the record of forecasters and adjust for it. However, even blatantly politically motivated forecasts often seem to be received uncritically.

Methods of Forecasting

Many techniques have been developed for predicting changes in economic activity. Some date back at least as far as 1862, when the French statistician Clement Juglar observed that longitudinal data on "prices and finance" appeared to indicate cyclical movements in business conditions. Since that time, substantial progress has been made toward identifying key aspects of business cycles and accurately interpreting their implications for future events. Among the various forecasting techniques are (1) an eclectic judgmental method that relies on an informal GDP model based on the forecaster's intuitive judgment and data of various types; (2) econometric models that incorporate statistically elaborate conjectures about relationships among key variables; and (3) analysis of selected economic series that usually have signaled cyclical turning points in aggregate economic activity.

Thus, current forecasting techniques range broadly. The metaphysically inclined eclectic judgmental/informal GDP model approach is highly unstructured, but sometimes some forecasters using the technique have achieved a record of accuracy better than analysts using more structured techniques. One of the most widely respected econometricians, Lawrence Klein, has conceded that certain individuals consistently have made relatively accurate economic predictions using this "seat of the pants" technique. The difficulty with such a technique is in passing it on in a form that can be learned and applied by others. If the forecaster will not or cannot communicate his technique to others, the technique (differentiated from the forecasts themselves) cannot be evaluated and users are forced either to reject the forecasts or to accept them "on faith."

On the other hand, econometric modeling pretends to far greater statisti-

cal sophistication, often comprising hundreds of mathematical equations that quantitatively relate the hypothesized major aspects of economic activity. The hypothesized key relationships, themselves, are those that by some statistical test of correlation reproduce the historical data patterns more closely than other mathematical relationships. Estimated (or assumed) data for certain significant economic variables — for example, the amount of Government spending, tax rates, interest rates, the money supply, foreign trade, financial flows, etc. — are entered into the equations as "givens," and then levels of specific economic activities are predicted from the many equations of the model.

This technique, with all its statistically tested equations, appears to be scientifically impressive. However, some crucial input data (usually called "basic assumptions") are derived solely from the forecasters' conjectures about future fiscal and monetary policies, energy policies, international events, wage and price developments, and a host of other important unknowns. Such judgments have no more reliability when applied to econometric models than when applied to informal GDP models; consequently, the forecasts based on such judgments also have no greater reliability.

Nevertheless, econometric models at least enable others to replicate the tests done by the model developer, which is an important aspect of scientific procedure. Furthermore, econometric modeling forces the theorist (and forecaster) to make explicit the factors deemed significant and the relationships among them. But these mathematical relationships — based on historic data and tested statistically by procedures that unrealistically limit the number of relationships and the direction of influence among the factors — have proven inadequate for accounting for human learning and adaptive ability: extrapolation of man's past behavior is not a reliable way to predict his future behavior in the highly specified way that econometric models do it. After many years of excess confidence in the usefulness of econometric forecasting, more econometric modelers now stress that the forecasts generated by their complex models can be relied upon only as a first approximation of future events. Unfortunately, the "warning label" that many econometric forecasters attach to their products gets lost by the time the forecasts are reported in the television news or widely read publications; consequently, the impression often is given that predicted events are near certainties.

Comparisons of forecasts with actual events have revealed that forecasts based on informal GDP models and on the more elaborate econometric models have been especially inaccurate at cyclical turning points in business activity. The usefulness of forecasting methods that fail to identify cyclical reversals before or shortly after they occur is greatly limited,

because those are the times when decisions based on erroneous forecasts are most costly.

Evaluation of the statistical indicators of business-cycle changes is another widely used method of economic forecasting. Statistical indicators are series that reflect various aspects of economic activity. When grouped according to the timing of their cyclical turns in relation to the timing of such turns in general business activity, each statistical indicator is classified as a leading, roughly coincident, or lagging series. We have found that the primary leading indicators signal reversals of general business activity just prior to or shortly after their occurrence, and they also are useful for forecasting continuing cyclical trends. However, the relationship between cyclical changes in general economic activity and those of the various indicators is not unvarying. Leading indicators generally do lead, but the length of the lead varies. Furthermore, the statistical indicators do not provide a basis for forecasting magnitudes of change in any aspect of economic activity. This leaves the statistical indicators less useful than might be preferred, but the state of economic understanding simply does not warrant more-developed predictions.

The Acid Test

Sadly, none of the methods described above provides reliable forecasts of magnitudes of various economic activities. Yet, forecasters predict to tenths of percentage points for several years into the future, and many persons evidently base policies on these numbers.

The acid test of any forecast of economic activity is its accuracy. Inaccurate forecasts, especially at cyclical turning points, may mislead the user and, therefore, may be worse than useless.

Some institutions have published detailed quarterly and annual forecasts of economic activity for some years, which provide an opportunity to check their record over a period long enough to be fairly sure that luck — good or bad — is not behind the results. From 1968 to 1990, the American Statistical Association (ASA) and the National Bureau of Economic Research (NBER) announced forecasts of economic activity in the United States based on responses to a survey. After 1990, the survey was taken over by the Federal Reserve Bank of Philadelphia. The work of these organizations in other areas has been highly regarded by professional economists and policymakers and hence their forecasts have received substantial outside attention. This survey compiles the predictions of a number of professional economic forecasters regarding the growth rates of 24 different economic measures.

Economists prepare forecasts for the current quarter and each of the

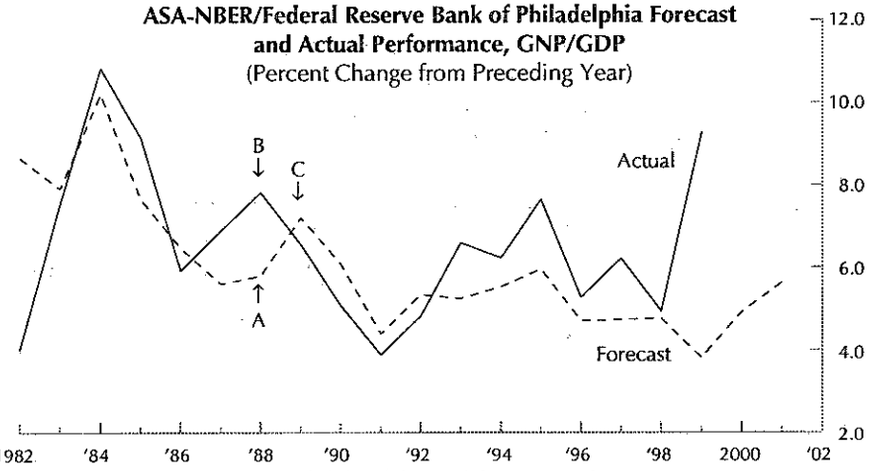
following four quarters, as well as for the current and following year. Respondents are also asked to provide a probability estimate that reflects the degree of uncertainty in their forecast. Chart 1 shows the *annual* forecasts for (nominal) GDP and the later-reported actual event. Forecasts were made 1 quarter before the year in question began. The "actual" data plotted are the data that would have been available at that time—that is, the data do not incorporate revisions or definitional changes that have occurred over time that may make the forecast look more or less accurate.

The data clearly show a substantial divergence between the forecasts and actual events. The (nominal) GNP/GDP forecast often has been wide of the mark (in 1992 the survey shifted from GNP to GDP). Since 1982, there have been several large errors. Most recently, actual GDP has been greater than that forecasted.

The records of individual forecasts may appear more impressive than they actually are because of the way they are portrayed in the charts. We illustrate by reference to the (nominal) GNP/GDP curve. Point A was the 1988 forecast of the percentage change in GNP from the 1987 GNP figure. This forecast was made in the fourth quarter of 1987. Point B was the actual percent change in GNP from 1987 to 1988. Before the forecast of 1989 growth in GNP (Point C) was made in late 1988, forecasters had actual GNP data for 3 quarters of 1988. So they would not be forecasting Point C from their 1988 forecasted value (Point A) but rather more nearly from the 1988 actual (Point B). In this sense, the "linear" depictions of

Chart 1

Prediction and Performance:
ASA-NBER/Federal Reserve Bank of Philadelphia Forecast and Actual Performance, GNP/GDP
(Percent Change from Preceding Year)



Source: Federal Reserve Bank of Philadelphia and the *Survey of Current Business*.

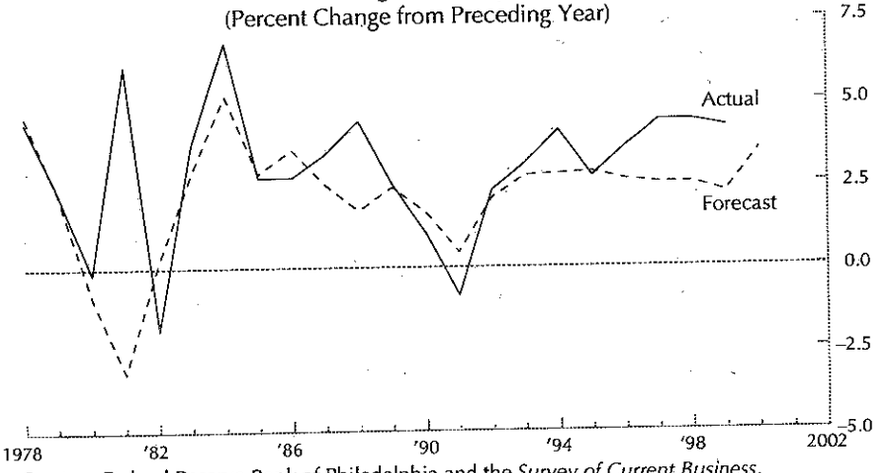
forecasted and actual values are misleading since distortions would be much greater if the previously forecasted values had been used as the basis for the following year's forecast. In effect, the prior year's forecasting errors are "forgiven" at the end of each year.

A change in the trend of general business activity from cyclical expansion to contraction is more difficult to forecast accurately than a continuation of trends. If a period of continued expansion had been involved, the accuracy of the forecasts probably would have been greater. Indeed, forecasters as a group became quite smug during the 1960s, and again during the 1990s, when the economy expanded almost continuously as the forecasters were predicting year after year. However, we emphasize that inaccurate forecasts at cyclical turning points have the most potential for inducing costly erroneous decisions based on the forecasts.

Another well-known and readily available forecast survey for the U.S. Economy is the Livingston Survey. The Livingston Survey is the oldest continuous survey of economic forecasts. The survey was started in 1946 by Joseph Livingston, a columnist for the *Philadelphia Inquirer*. Livingston conducted the survey until his death in 1990. After his death, the survey was taken over by the Federal Reserve Bank of Philadelphia. In all cases, the forecasts for each period were made in December of the preceding year. Chart 2 reveals the accuracy (or inaccuracy) of the survey's forecasts. The Livingston Survey failed to predict the recessions in 1991 and 1982 (*i.e.*, when the percent change in GDP became negative). It also missed the

Chart 2

Mean GNP/GDP Forecast
– Livingston Survey –
(Percent Change from Preceding Year)



Source: Federal Reserve Bank of Philadelphia and the *Survey of Current Business*.

brief expansion in 1981. Although it tracked GNP/GDP fairly well during other periods, it missed the turning points — when accurate forecasts are most critical (and hardest to achieve).

The futility of attempting to forecast specific rates of any economic activity, even in the short term, seems abundantly clear. That some economists have placed great reliance upon specific forecasts for 5, 10, or even 25 years in the future is beyond our comprehension. Nevertheless, such specific forecasting goes on without pause. It is defended with the argument that present decisions require some estimate of future conditions, so the forecasters might as well give theirs. If such exercises were purely academic, they would not be harmful. Unfortunately, businessmen and investors who have made decisions based on such forecasts often have incurred substantial losses and government officials often have adopted harmful policies because they relied on unwarranted forecasts.

There is no doubt that more problems could be avoided or solved if economists could make accurate forecasts, but, as long as that is elusive, there is a grave danger in such forecasts even being made.

A "Modest" Alternative

As we stated above, we have found the statistical indicators of business-cycle changes to be useful in forecasting reversals in such cycles just prior to or shortly after their occurrence and in forecasting continuations of trends. To date we have not found them useful for forecasting the magnitudes of probable changes. Nevertheless, because reversals in cyclical trends of economic activity usually require that substantial changes be made in production schedules, orders for raw materials, size of the work force, etc., the knowledge of imminent or recent cyclical reversals or of continuations of trends would seem to be useful to businessmen. Securities investors and Government policymakers also may put such forecasts to good use.

Table 1 lists the eight most recent business cycles, the months in which we first "forecast" that a reversal was imminent, and the lead or lag time of our forecast from the appropriate peak or trough. Readers should note that at each business-cycle peak except that in 1981, we forecast the reversal from 0 to 7 months before it occurred. That our forecast in 1981 was 3 months after a peak occurred was attributable to the closeness with which the 1981 recession followed the 1980 recession.

At each business-cycle trough, our "forecast" that expansion probably would begin was from 1 to 3 months after the trough had occurred, except for the November 1982 trough when we forecast the business upturn 7 months before it occurred and the November 1970 trough when we failed

Table 1

AIER "Forecasts" of Business-Cycle Turns

Peaks		Troughs	
Reference Cycle	*AIER Forecast*	*Reference Cycle*	*AIER Forecast*
Jul. 1953	Jun. 1953 (–1)*	May 1954	Jun. 1954 (+1)*
Aug. 1957	Jan. 1957 (–7)	Apr. 1958	Jun. 1958 (+2)
Apr. 1960	Feb. 1960 (–2)	Feb. 1961	May 1961 (+3)
Dec. 1969	Aug. 1969 (–4)	Nov. 1970	Mar. 1972 (+16)
Nov. 1973	Nov. 1973 (0)	Mar. 1975	Jun. 1975 (+3)
Jan. 1980	Jul. 1979 (–6)	Jul. 1980	Sept. 1980 (+2)
Jul. 1981	Oct. 1981 (+3)	Nov. 1982	Apr. 1982 (–7)
Jul. 1990	Jan. 1990 (–6)	Mar. 1991	Jun. 1991 (+3)

* Lead (–) or lag (+) in months from business-cycle peak or trough.

to call the turn until some 16 months later.* There are many reasons for the general tardiness of forecasts at troughs. The average leads of the indicators are less at troughs than they are at peaks. In some instances the lead is only 1 or 2 months. Because data for a particular month sometimes are not available until 2 or 3 months later, tardiness is almost guaranteed. For example, data for January may not be available until March for some series. Finally, data for several months usually are needed before a change in the direction of a series can be interpreted as a reversal of the cyclical contraction rather than a temporary interruption of it.

In addition to our record described above, we accurately warned of the "mini-recessions" during 1951-52, 1967, and 1986. However, we also warned of the probability of impending recessions during 1962 and 1965, neither of which occurred.

Although our record is respectable, it leaves much room for improvement. In 1988 we implemented a modification of our method of assessing the statistical indicators. To date, this refinement has improved our ability to predict reversals in cyclical trends, but we still have not found a useful method for predicting magnitudes of probable changes.

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* A major automobile strike late in 1970 (which temporarily depressed economic activity beyond that from cyclical conditions alone) and a large accumulation of strike-hedge steel inventory during the first half of 1971 complicated the cyclical picture in 1970-71. Because of these noncyclical developments, cyclical conditions were obscured, and we were unable to assert confidently that the cyclical trough had occurred until the late month that we did so.

II.

THE STATISTICAL INDICATORS

Introduction

STUDENTS of American economic history ascertained that month-to-month business activity tends to move in a cyclical fashion. A cycle, put simply, constitutes a period of time in which series of events repeat themselves more or less regularly and in roughly the same order. This tendency to move in a cyclical manner has been traced back to 1854. From that time to 1991, 31 complete business cycles have been identified (we now are in the 32nd). The structure of our modern economic system is substantially different from that of 1854, yet the business cycle persists, manifesting many of the same characteristics now as it did then. The occurrence of business cycles appears to be one of the few economic events one can count on, and a turn up or down in one of those cycles is an event of considerable social significance.

Substantial interest, therefore, properly focuses on methods for forecasting economic turns. The economic indicators, which are measures of various economic activities compiled by government agencies, private organizations, and individual economists provide one such method. The analysis of economic indicators, also called statistical indicators, has occurred for many years. Compared with the "sophistication" of an econometric model, this method may seem unimpressive. Why, then, is it still used when econometric models are available? Many answers are possible, but the primary reason probably is that the statistical indicators method, which relies heavily on empirical data, produces results just as useful as, if not more useful than, econometric models, which may involve highly abstract methods. If any particular forecasting technique had a consistent track record of accurate prediction, it almost certainly would soon replace all other methods. That there is not one overwhelmingly successful forecasting technique accounts for the variety of techniques used, including the statistical indicators.

Statistical indicators include just about every quantitative measure of economic change that is continuously available. As a result, persons interested in forecasting changes have an abundance of factual information with which to work. The technique of indicator analysis encompasses various systematic approaches to looking at this information with an eye toward uncovering significant developments in the business cycle.

Historical Development

One of the first groups of widely known economic indicators was pub-

lished in 1919 by the Harvard University Committee on Economic Research under the direction of Warren M. Persons. The Harvard Index Chart, later known as the Harvard ABC curves, represented three sectors of the economy. The A curve measured stock prices, and was interpreted to signal investor speculation. The B curve measured the dollar volume of checks drawn on bank deposits, which served as a rough guide of current business activity. The C curve measured short-term interest rates, which represented money market conditions. Studies of these curves revealed that they usually moved in sequence: upturns in stock prices usually were followed by upturns in first business activity and then interest rates. The interrelation of lags and leads appeared to provide an effective forecasting method.

This system of economic indicators proved widely popular during the late 1920s and remained in use into the early 1930s. During the Great Depression, however, the Harvard curves were discarded as a tool for forecasting the near-future trend of business activity, because the index allegedly failed to forecast that depression correctly. It is more probable, however, that the failure was in the interpretation of the data rather than in the Harvard curves themselves.

The substantial decrease in common stock prices (A curve) during the later part of 1929, 1930, and 1931 surely should have signaled a contraction of business activity. However, researchers analyzing the Harvard curves apparently chose to dwell on sporadic 1-month or 2-month increases in stock prices to forecast a pick-up in business activity while completely ignoring their overall downward trend. The Harvard Index Chart was discontinued in 1941.

Notwithstanding its fate, the development of the Harvard curves was a first step in the development of statistical indicators of business-cycle changes. Additional study revealed that Warren Persons was correct in identifying that turns in stock prices lead turns in business activity, and that money rates tend to lag. (We presently use similar statistical indicators for similar purposes: the index of 500 common stocks prices as a primary leading indicator of business activity, and a composite of short-term interest rates as a primary lagging series.) However, many other aspects of business-cycle changes remained to be analyzed. The staff of the NBER understood this and has since done a prodigious amount of "laboratory" work.

During the 1920s, the NBER began accumulating and analyzing data on various aspects of the economy, such as production, employment, prices, sales, and interest rates, in order to establish a factual basis for studying business cycles. Wesley Mitchell and Arthur Burns did much of the work,

which involved studying a total of 487 series. Data for the vast majority of these series were available only following World War I; however, some of the series dated as far back as the 1850s.

During the spring of 1937, the U.S. economy once again entered a period of recession, without having completely recovered from the 1929-33 depression. In the autumn of 1937, Henry Morganthau, Jr., Secretary of the Treasury, asked the NBER to develop a series of indicators that would signal when the recession was about to end. In May of 1938, Mitchell and Burns published an NBER bulletin titled, "Statistical Indicators of Cyclical Revivals." In that bulletin, 71 series were identified as "tolerably consistent in their timing in relation to business cycle revivals..." Of these series, 21 were included in "A List of the Most Trustworthy Indicators of Business Cycle Revivals." This marked the introduction of the statistical indicators of business-cycle changes as we know them today.

This list of 21 indicators was successfully used for forecasting the expansion of business activity that began in June 1938. Fourteen of the 21 series began to expand between 1 and 6 months prior to the expansion of general business activity. Of the remaining seven, three series expanded with, and three lagged behind general business activity.

Since 1938 the series used as statistical indicators have been modified, replaced by other series, and improved in an effort to develop a more reliable tool to help forecast cyclical trends in business activity. In the 1960s, the Department of Commerce began publishing regular updates on the indicators, and a few years ago The Conference Board, a private organization, took over this job. Of the 21 "original" primary leaders, only four series (or similar series) now are included in the list of primary leaders.

With the advent of computer technology in the early 1950s, the study of statistical indicators was advanced as more series could be studied and more complex statistical analysis could be done.

What, Why, and How

Events of the early 1990s clearly indicate that the business cycle has not been eliminated and that perpetual prosperity is far from assured, contrary to what many economists suggested during the late 1960s. At that time, key members of Lyndon Johnson's Council of Economic Advisers were so confident that the U.S. economy would expand without the nasty interruptions known as recessions that they forced a name change in one of the most important sources of statistical information published by the government, the *BCD*. Before the Johnson years, the full title of the publication was *Business Cycle Developments*. With its conviction that recessions were a thing of the past, the new school changed the name of the publica-

tion to the *Business Conditions Digest.*

The lesson has still not been fully learned. Only a few years ago, budget analysts predicted there would be huge deficits for the foreseeable future. Having been wrong by hundreds of billions of dollars, they now predict huge surpluses based on "more accurate long-term forecasts." This belief would appear to be based more on hope than experience. One key assumption is that the U.S. economy will not experience a recession for the next 10 years. For this to happen, the economy would have to grow continuously from 1991 (when the current expansion began) through 2010, providing 19 years of uninterrupted growth. This is possible, but not likely. The longest expansion in U.S. history—the current one—has lasted less than 10 years.

Statistical indicators are quantitative representations (measures) of various aspects of business, or economic, activity. Such activity is an on-going process that involves millions of transactions every day. If these transactions or events can be combined, measured, and charted, a graphical representation of different aspects of business activity can be created. For example, the daily prices of 500 common stocks are collected, combined into an index, and charted as a monthly average. This resulting series is a representative indication of price movements in the stock market (one aspect of business activity). Other, economically significant aspects include sales, prices, profits, debt, capital investment, employment, interest rates, housing, and industrial production, which also are measured and graphed in similar fasl ion. Inasmuch as these types of series actually measure different aspects of business activity, they vary cyclically as does business activity. Series that historically have proven to reflect business-cycle changes *consistently in the same manner* are used as the statistical indicators.

After much analysis, the NBER ascertained that historically changes in the trend of business activity were preceded by changes in the trends of certain series. Other indicators historically changed direction at about the same time as did business activity, and still others changed direction only after general business activity had changed. Researchers then grouped those statistical series according to their timing in relation to business cycles: leading, roughly coincident, and lagging. The general relationship of movements in these three groups is portrayed in Chart 3. This chart does not represent an actual business cycle; rather it represents the characteristic timing of the groups. In reality, the curves are not as smooth, nor the relation between them as exact, as is indicated.

As the name implies, the leading indicators are the ones useful for forecasting the future trend of business activity. Because turns in the series in this group consistently have preceded turns in business activity, they can

be expected to precede, and thus to signal, future turns in such activity. Individual series may fail to forecast a given cyclical change or may falsely signal a change that does not occur. However, the group of leaders has turned fairly consistently prior to turns in business activity.

Although much emphasis is placed on the leading series because of their usefulness for prediction, the roughly coincident and lagging series should not be ignored. Because the roughly coincident series reflect the recent trend of business activity, analysis of them is important. Employment, GDP (Gross Domestic Product) and industrial production, all coincident series, are the most often referred to of all the statistical indicators.

The lagging series probably are given the least attention by the average businessman and by the news media. One might ask why series that historically have not turned until after business activity has turned should be analyzed. The reason is that cyclical turns in the lagging series are useful for confirming cyclical turns in business activity. If GDP or any other reflection of the recent trend of business activity decreased for, say, half a year, but the laggers continued to increase, this would raise doubt that a cyclical contraction of business activity had begun.

Some Difficulties

Readers should note that the statistical indicators are not infallible and that some difficulties are associated with their use in predicting business trends. Some of these difficulties are described below.

Chart 3

Movement of Business-Cycle Indicators

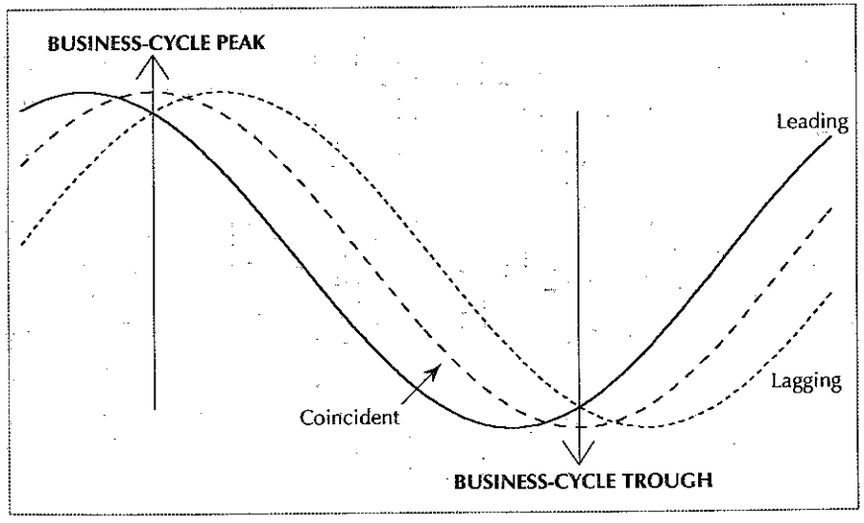


Table 2
Cyclical Expansions and Contractions of Business Activity Since 1854

Troughs	Peaks	Expansions	Contractions
Dec. 1854			
	Jun. 1857	30	
Dec. 1858			18
	Oct. 1860	22	
Jun. 1861			8
	Apr. 1865	46	
Dec. 1867			32
	Jan. 1869	18	
Dec. 1870			18
	Oct. 1873	34	
Mar. 1879			65
	Mar. 1882	36	
May 1885			38
	Mar. 1887	22	
Apr. 1888			13
	Jul. 1890	27	
May 1891			10
	Jan. 1893	20	
Jan. 1894			17
	Dec. 1895	18	
Jun. 1897			18
	Jun. 1899	24	
Dec. 1900			18
	Sept. 1902	21	
Aug. 1904			23
	May 1907	33	
Jun. 1908			13
	Jan. 1910	19	
Jan. 1912			24
	Jan. 1913	12	
Dec. 1914			23
	Aug. 1918	44	
Mar. 1919			7
	Jan. 1920	10	
Jul. 1921			18
	May 1923	22	
Jul. 1924			14
	Oct. 1926	27	
Nov. 1927			13
	Aug. 1929	21	
Mar. 1933			43
	May 1937	50	
Jun. 1938			13
	Feb. 1945	80	
Oct. 1945			8
	Nov. 1948	37	
Oct. 1949			11
	Jul. 1953	45	
May 1954			10
	Aug. 1957	39	
Apr. 1958			8
	Apr. 1960	24	
Feb. 1961			10
	Dec. 1969	106	
Nov. 1970			11
	Nov. 1973	36	
Mar. 1975			16
	Jan. 1980	58	
Jul. 1980			6
	Jul. 1981	12	
Nov. 1982			16
	Jul. 1990	92	
Mar. 1991			8
	?	116+?*	

Note: Underscored figures are the wartime expansions (Civil War, World Wars I and II, Korean War, and Vietnam War) and the postwar contractions.
Source: As measured by the National Bureau of Economic Research.
* As of November 2000.

For a series to be a useful indicator, data must be available for a relatively long period of time. If series could be found for which accurate data were available for 200 years, the trends of these series during many different situations could be analyzed. One then would have a useful guide for assessing probable conditions during future similar trends. (Readers should note, however, that accurate data available for 200 years still would reflect only past occurrences, and that because of the uniqueness of every business cycle, future business cycles may differ from those past.) Prior to World War II, the data that were available for many series were scarce and often of highly questionable accuracy. For most series, adequate data are available only since 1947 and in some instances later than that.

Since 1947, nine contractions of general business activity have been identified. These are listed in Table 2, along with the eight complete expansions that have occurred since then (the business cycles that occurred between 1854 and World War II are listed in the table as well). Including the most recent recession (ending in March 1991), all of the postwar contractions have been less severe than the Great Depression (which lasted 43 months) and less severe than several of the recessions prior to the Great Depression. Before World War II, the 22 contractions in business activity averaged 21 months in duration. The nine since World War II have averaged 11 months in duration. Postwar expansions have lasted 57 months on average.

Because available data for the indicators currently in use cover only these post-World War II cycles, there is no way of knowing how the indicators would change if an unusually severe depression were to occur again. There is the *possibility* that a sudden economic collapse, precipitated by, say, a major financial shock such as massive bank failures, would not be signaled in advance by the statistical indicators. In the event of a sudden shock, there may be little or no warning from the leading indicators of business-cycle changes, because data for a number of months are required before making a reliable assessment of a change in the cyclical status of the indicators. **Furthermore, this Nation has participated in an unprecedented inflationary experiment for more than 3 decades and, for the first time in modern history, there is no major nation in the world that has a gold-based currency. Therefore, past reliability of the series used as indicators may not continue in the existing situation. These unique and risky aspects of today's economic situation must constantly be kept in mind in any assessment of the possible future trend of business activity.**

The increasing general price trend, or loss of buying power of the dollar, fostered by this inflating has already had an impact on some of the indica-

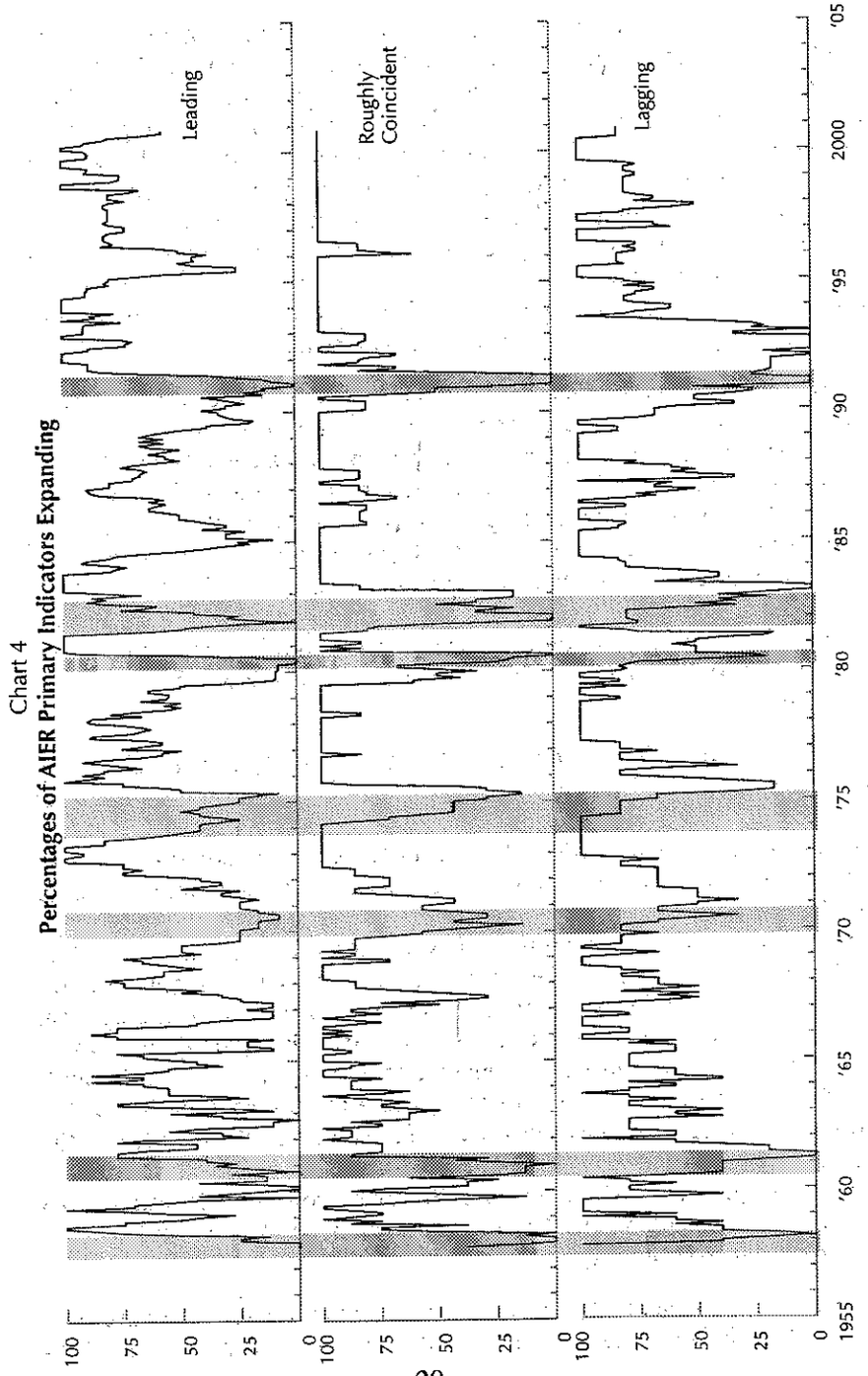


Chart 4
Percentages of AIER Primary Indicators Expanding

tors. Many series used as business-cycle indicators were, and some still are, denominated in current dollars. (See the glossary for a description of the term "current dollars.") These series can be distorted by price changes that sometimes reduce their usefulness as indicators. Whether changes in such series reflect price changes alone, changes in the basic activity, or a combination of the two, is not clear from the base data themselves.

Partly because of these price distortions, The Conference Board (TCB) continuously revises their statistical indicators, replacing some series distorted by price changes. Some of these series are included in our list of the statistical indicators, which are published once a month in our twice-monthly *Research Reports*. In addition, we have incorporated in our list of indicators some series that replace or supplement those published by TCB. Although our list of primary leading indicators numbers includes roughly the same number as that of The Conference Board (twelve vs. ten, respectively), the individual components are different (see box on p. 22). Not all of these replacements were made to minimize data distortions related to currency depreciation; some of them simply performed better at peaks and troughs.

Earlier we noted that our analysis of the statistical indicators is not infallible and many difficulties have been sizable in the past. Our "track record" of predictions is shown in Chart 4. (A full description of our forecasting method is presented in the next chapter.)

Our own experience with the statistical indicators supports the admonition that they should not be used independently of all else in forecasting the trend of business activity. They simply provide some evidence that one can use in addition to other pertinent information. We agree with the view, "Good results can only be expected if the current behavior of such [indicators] is interpreted with experienced judgment and in light of other evidence."*

Selection of Series

First the NBER, then the Department of Commerce's Bureau of Economic Analysis (BEA), and now The Conference Board (TCB) have analyzed hundreds of economic time series in the search for the ones most useful as statistical indicators of business-cycle conditions. Currently (late 2000), TCB maintains a database with more than 250 economic series. They cover the most important aspects and sectors of the U.S. economy such as employment and unemployment; output, production and capacity utilization; sales and orders; wages and consumer attitudes; durable goods

* Victor Zarnowitz and Charlotte Boschan, "Cyclical Indicators: An Evaluation and New Leading Indexes," *Business Conditions Digest*, May 1975, p. xiv.

BUSINESS-CYCLE INDICATORS COMPARED

AIER	The Conference Board
Leaders	
1. M2 Money Supply	1. Same
2. Average Weekly Initial Claims for Unemployment Insurance	2. Same
3. Average Workweek in Manufacturing	3. Same
4. Manufacturers' New Orders for Consumer Goods and Materials	4. Same
5. Vendor Performance	5. Same
6. Index of 500 Common Stocks Prices	6. Same
7. New Private Housing Permits	7. Same
8. Contracts and Orders for Plant and Equipment	8. Manufacturers' new orders for non-defense capital goods
9. Rate of Change in Consumer Debt	9. Index of Consumer Expectations
10. M1 Money Supply	10. Interest rate spread 10-year Treasury bonds less federal funds
11. Ratio of Manufacturing and Trade Sales to Inventories	
12. Change in Sensitive-Materials Prices	
Coinciders	
1. Employees on Nonagricultural Payrolls	1. Same
2. Index of Industrial Production	2. Same
3. Manufacturing and Trade Sales	3. Same
4. Personal Income in Manufacturing	4. Personal Income Less Transfer Payments
5. Ratio of Civilian Employment to Working-Age Population	
6. Gross Domestic Product	
Laggers	
1. Average Duration of Unemployment	1. Same
2. Change in Index of Labor Costs per Unit of Output, Manufacturing	2. Same
3. Commercial and Industrial Loans Outstanding	3. Same
4. Ratio of Consumer Debt to Personal Income	4. Same
5. Composite of Short-term Interest Rates	5. Average Prime Rate Charged by Banks
6. Manufacturing and Trade Inventories	6. Ratio of Manufacturing and Trade Inventories to Sales
	7. Change in Consumer Price Index, Services

Note: All dollar-denominated series are in constant dollars. In some cases, the base data used by AIER and TCB are the same but are used to calculate different series (e.g., moving averages).

orders and fixed capital investment; inventories; prices and profits; money, credit and interest rates, and prices. Each cyclical indicator series is classified as leading, coincident, lagging, or unclassified at reference cycle peaks, troughs, and overall. In addition, TCB constructs composite indexes of leading, coincident, and lagging indicators. The historical records of these composite indexes are plotted in Chart 5.

Until March 1977, each statistical indicator was classified for its timing characteristics over the entire business cycle. Separate classification at peaks and at troughs was not made. The current classifications have the advantage of greater precision at turning points, but they have the disadvantage of forcing the analyst using them to predetermine if a cyclical expansion or contraction is under way. Oftentimes this is not a problem, as when an expansion has prevailed for 2 or 3 years. However, if a downward trend continues for, say, 5 months, after an upward trend of 12 months, one must decide whether to use the series classified for peaks or the series classified for troughs. Because of this problem, the indicators we use are classified for the entire cycle.

The process of evaluating an individual series is rather complex, and TCB has considered many factors in analyzing the usefulness of a series. TCB rates a potential indicator according to six characteristics: economic significance, statistical adequacy, timing, conformity, smoothness, and currency.

Economic significance refers to the importance of the economic process being measured and evaluated. This is considered one of the most important criteria for selecting a useful statistical indicator. If a series such as the average monthly temperature in Miami, Florida, for example, ranked high in the other five rating areas, its lack of economic significance would disqualify it as an economic indicator.

Statistical adequacy refers to how the data are collected, analyzed, and developed into an economic time series. Only series that have acceptable means of data measurement are considered statistically adequate. One major indication of inadequacy is a need for continual revision.

Currency refers to the early availability of data. A series for which data are not available until several months after the fact is of little use in ascertaining the present or future trend of general business activity. Lack of currency was the major reason the "corporate profits" series was dropped by the NBER as a primary leading indicator. Data for this quarterly series are not available until 2 months after the quarter has ended.

Timing, conformity, and smoothness refer to the movement of the data in relation to the business cycle. Timing is the relationship between cycli-

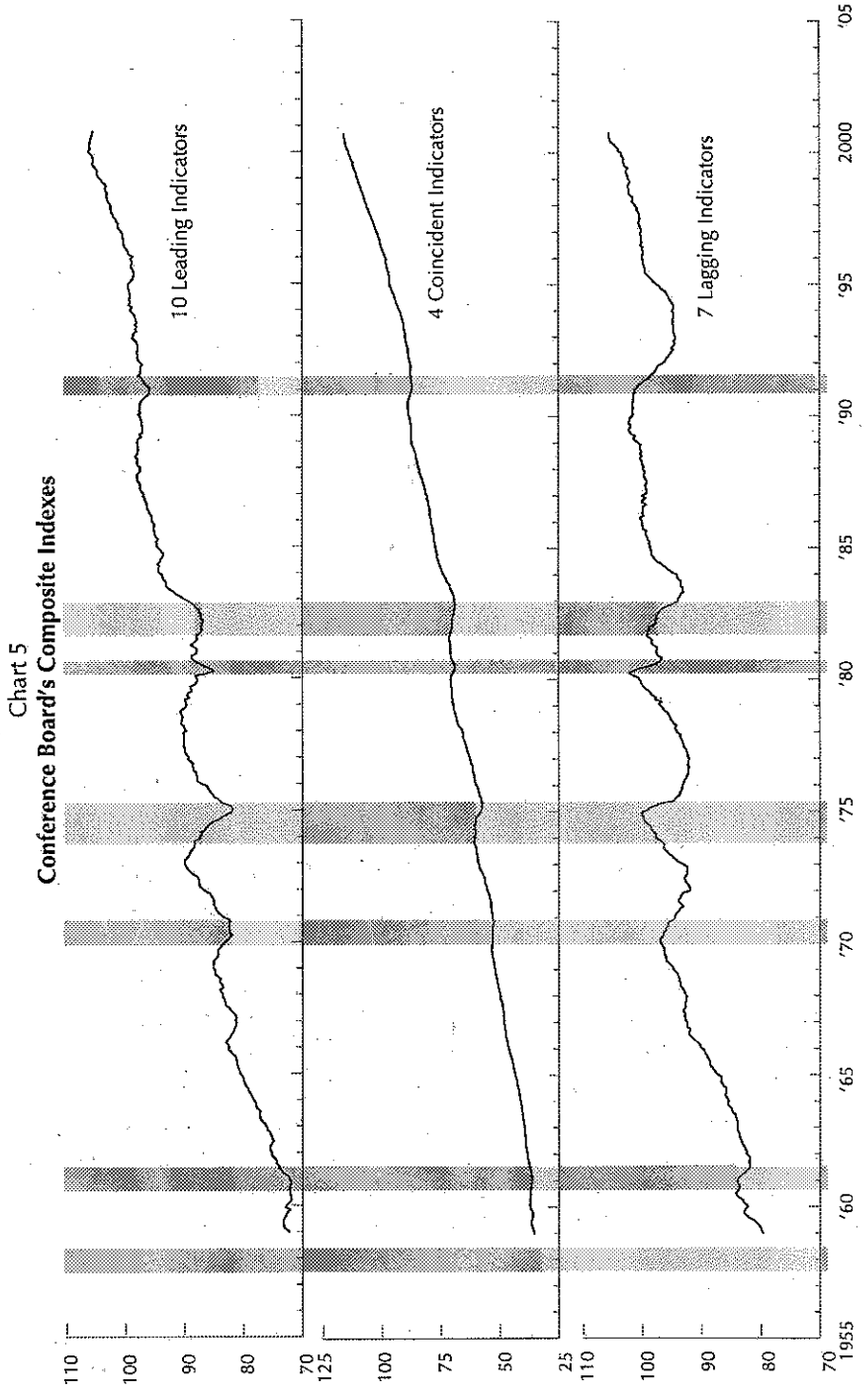


Chart 5
Conference Board's Composite Indexes

cal changes in a particular series and those in general business activity. Timing determines whether a series is a leading, roughly coincident, or lagging indicator. Conformity is a measure of the degree to which the series moves consistently with general business activity, and is revealed by the number of false signals and missed turns in that series. Smoothness refers to the magnitude of irregular fluctuations in a series. A series that fluctuates erratically from month to month is of little use as an indicator, because the moving average required to smooth the data would be so long as to create a problem of its currency. Series selected as statistical indicators received high scores in all six rating areas.*

With reference to timing and conformity, no two series, or business cycles, are exactly alike. Changes in individual series are different for each business cycle. For example, a series identified as a leading indicator may not lead by the same number of months at every turn in the business cycle. It may lead by 15 months on one occasion, by 9 months another time, and by only 5 months at yet another turn. Also, individual series change differently at business-cycle peaks than they do at troughs.

TCB has identified numerous statistical indicators of business-cycle conditions that satisfy these criteria, and has assigned each a timing status at peaks, troughs, and overall. The majority of these series reflect activity in the goods-producing sector of the economy. The service-producing sector is not as heavily represented, even though it has grown steadily throughout the postwar era while the goods-producing sector has shrunk. Similarly, international trade is given relatively little representation among TCB indicators, although it, too, accounts for a growing portion of business activity. The primary reason for TCB's focus on the goods-producing industries is that historically they are more cyclically sensitive than the service-producing industries. Thus, the goods-related industries, and particularly the manufacturing-related series, are more apt to signal turning points in economic activity.

Nonetheless, some economists have suggested that TCB's set of indicators provides an incomplete measure of overall economic activity and may lead to distorted appraisals of business-cycle conditions. However, in an extensive study completed in 1989, the BEA was unable to find any statistical series directly related to services or international trade that satisfied the six criteria for a useful leading indicator of business-cycle conditions. (The study did identify one new lagging indicator of service-sector activity, which was subsequently added to the composite lagging

* For a more extensive discussion of the selection of useful indicators see Geoffrey H. Moore, *Business Cycles, Inflation, and Forecasting*, NBER Studies in Business Cycles, No. 24, 1980.

index.)

As of this writing, the TCB uses 21 series to compile its composite indexes. These include 10 leading, four coincident, and seven lagging indicators—all classified by the TCB as consistently leading, coinciding, or lagging at peaks and troughs. In our monthly analyses, we use 24 series (12 leaders, six coinciders and six laggers), of which 15 are identical to series on the TCB's "short list." The identical series include seven leaders, three coinciders, and four laggers. (See box on p. 22 for comparison.)

Among the leading series, we deflate common stock prices by the Consumer Price Index, while the TCB uses the current-dollar series. We use five series the TCB does not, including contracts and orders for plant and equipment, the rate of change in consumer installment debt, the ratio of manufacturing and trade sales to inventories, and M1 money supply. The Conference Board uses three series we do not—manufacturers' new orders for non-defense capital goods, the index of consumer expectations, and the interest rate spread between 10-year Treasury bonds and federal funds.

We use three of the TCB's coinciders. However, instead of personal income less transfer payments, we use personal income in manufacturing. We also include two additional indicators: the civilian employment to population ratio and constant-dollar GDP. Among the laggers, we use the constant-dollar level of manufacturing and trade inventories instead of its ratio to sales and we use a composite of market-determined short-term interest rates (the average of prime 30-day commercial paper rate and 3-month Treasury bill rate in the secondary market) instead of the bank's prime rate (which is an "administered" rate and often subject to political manipulation).

Finally, we use the ratio of consumer installment debt to personal income as a lagger instead of the rate of change of the services component of the CPI. This is the only difference that involves dissimilar economic phenomenon (*i.e.*, all the others involve different ways of measuring the same thing). As noted above, the services price series is a fairly recent addition to the TCB's list. Future changes in both the TCB's "short list" and our list of primary indicators are likely to occur as the result of further research and to reflect changes in economic behavior and practices.

In any event, our primary series reflect developments in a number of important economic activities and are in our judgment the most useful for assessing business-cycle trends and imminent changes in them. Brief descriptions of each of these series and of the sources of data for them are provided in Chapter IV.

We track the average number of months by which each individual series

led or lagged the appropriate peak or trough of the "reference cycle," as well as the ranges of the leads and lags. The peaks and troughs of the reference cycle, also referred to as the general "business cycle" or "economic cycle," are determined by the NBER, after studying revised data and their trends. Average leads and lags are calculated for the base series as well as for their MCDs (months for cyclical dominance). The leading series as a group have led cyclical peaks by about a year and a half and have led cyclical troughs by about 5 months. The coincident series have roughly coincided with reference peaks and troughs. At peaks, the laggers have turned slightly after general business activity has done so; at troughs, several months after.

Caution must be used when interpreting these averages. For most of the series we only have reliable data for the past nine cycles. Given so few cycles, any abnormally long or short lead or lag in any one of the cycles strongly affects the average. As we encounter more cycles, the effect of any one lead or lag on the average will diminish.

III.

METHODS OF ANALYSIS

MANY methods are available for analyzing the statistical indicators. One of the more common is the composite index approach. Composite indexes of economic indicators measure the behavior of a group of economic time series that show similar timing at business-cycle turns but differ widely in terms of the sectors of the economy represented. The two main criteria used by The Conference Board (TCB) to select and group the components of the indexes are cyclical timing and overall performance. The more consistent series that tend to lead at business-cycle turns are combined into a composite leading index; those that tend to coincide with the business cycle, into a composite coincident index; and those that tend to lag, into a composite lagging index. TCB publishes these indexes monthly, and the composite index of 10 leading indicators (see Chart 5) is given considerable attention among financial and popular news media.

Although a substantial amount of effort was expended in developing these indexes (to minimize the degree to which more volatile series affect the index), composite indexes are not always useful tools for studying the statistical indicators. Changes in the composite index of leading indicators sometimes are attributable to only a few of its components, which raises doubt about the implication of the change in the composite. For example, at the beginning of 1982, the BEA's leading composite index decreased 1.1 percent during January, 0.2 percent during February, and remained at February's level during March, for a total decrease of 1.5 percent during the first quarter of 1982. Thus, the BEA's widely followed indicator showed no sign of recovery. But, only three of the 12 series then used by the BEA accounted for the total decrease. The three series that dominated were highly volatile, producing many "false signals" during expansions. All three were subject to frequent revision affecting their timeliness as leading indicators. Analysis of the individual series, rather than the leading composite, reduces the chance that such special influences will be overlooked.

In an effort to improve the forecasting accuracy of its leading composite index, in 1989 the BEA announced major modifications to the index. Some series included in the index were replaced by others, and the total number of series included was reduced from 12 to 11. The earlier procedure of assigning different weights to the various series when compiling the index was discarded. The revised index remains subject to disproportionate influence from only a few of its components, however. For example, in late 1987 when the stock market "crashed," the revised BEA index decreased

for 3 consecutive months (October, November, and December). Downward trends of 3 or more months in the index often have preceded recessions, and thus it would appear that the index was signaling recession. Once again, however, the decrease was attributable to only a few series rather than widespread economic weakness. The signal turned out to be false — a recession did not follow. That most of the indicators had not signaled recession was masked by the decrease in the composite index.

In 1993, the BEA modified the composite indexes again. The new methodology was intended to correct a flaw in the old method that distorted the cyclical pattern of the indexes in periods of slow growth, such as in the beginning of the current expansion. Upon taking over responsibility for cyclical indicators in 1996, The Conference Board deleted two series and added another to bring the number of indicators in the composite leading index to its current number of ten. Analysis of the individual effects of the different types of revisions shows that the change in the components of the composite lessens the "false signal" problems in 1984 and 1995. It remains to be seen how well the new index will predict the peak of the current expansion.

Although we analyze many of the same leading, roughly coincident, and lagging indicators that TCB uses in its composite series, due to the potential problems we analyze the individual series rather than the composite indexes. Our method of analyzing the statistical indicators of business-cycle changes has six steps that are listed below and are discussed in detail following the outline.

1. The most recent monthly data (or quarterly data where applicable) for each series are plotted on a chart when they become available, and back data are replotted when revisions are reported.

2. We calculate and plot the moving average for each series from the unaveraged data, and revise prior data as necessary.

3. The individual series are examined and, based on the probability that they will or will not change direction, their apparent cyclical statuses are assessed.

4. We calculate the percentage of each group of indicators (leading, roughly coincident, and lagging) appraised as expanding cyclically.

5. Each group of indicators is examined in relation to the other groups, and we make our appraisal of the present and near-future cyclical trend of general business activity.

6. Other evidence useful for assessing business-cycle conditions is analyzed to see if it is consistent with or contrary to the apparent signal of

the indicators, in which instance we would place, respectively, more or less confidence in the signal of the indicators.

Plotting the Data

Data for individual series become available at different times during the month because different agencies collect and report the data. For some series the most recent data are published in the financial newspapers, such as *The Wall Street Journal*, as soon as they are reported by the source agency. The most reliable source for the majority of the base data, however, is the *Survey of Current Business*, which is published monthly by the U.S. Department of Commerce, Bureau of Economic Analysis. The *Survey* provides the most recent data, as well as historical data, for over 250 series, including many of our statistical indicators. (Much of this information previously appeared in the *BCD*, a Government publication that ceased publication in early 1990.) Some data for our series are taken from other official publications. All of the publications are available electronically and are downloaded as soon as they are released.

The most recent data and any revised data for each series are plotted on charts that in general date back to 1948.

Moving Averages

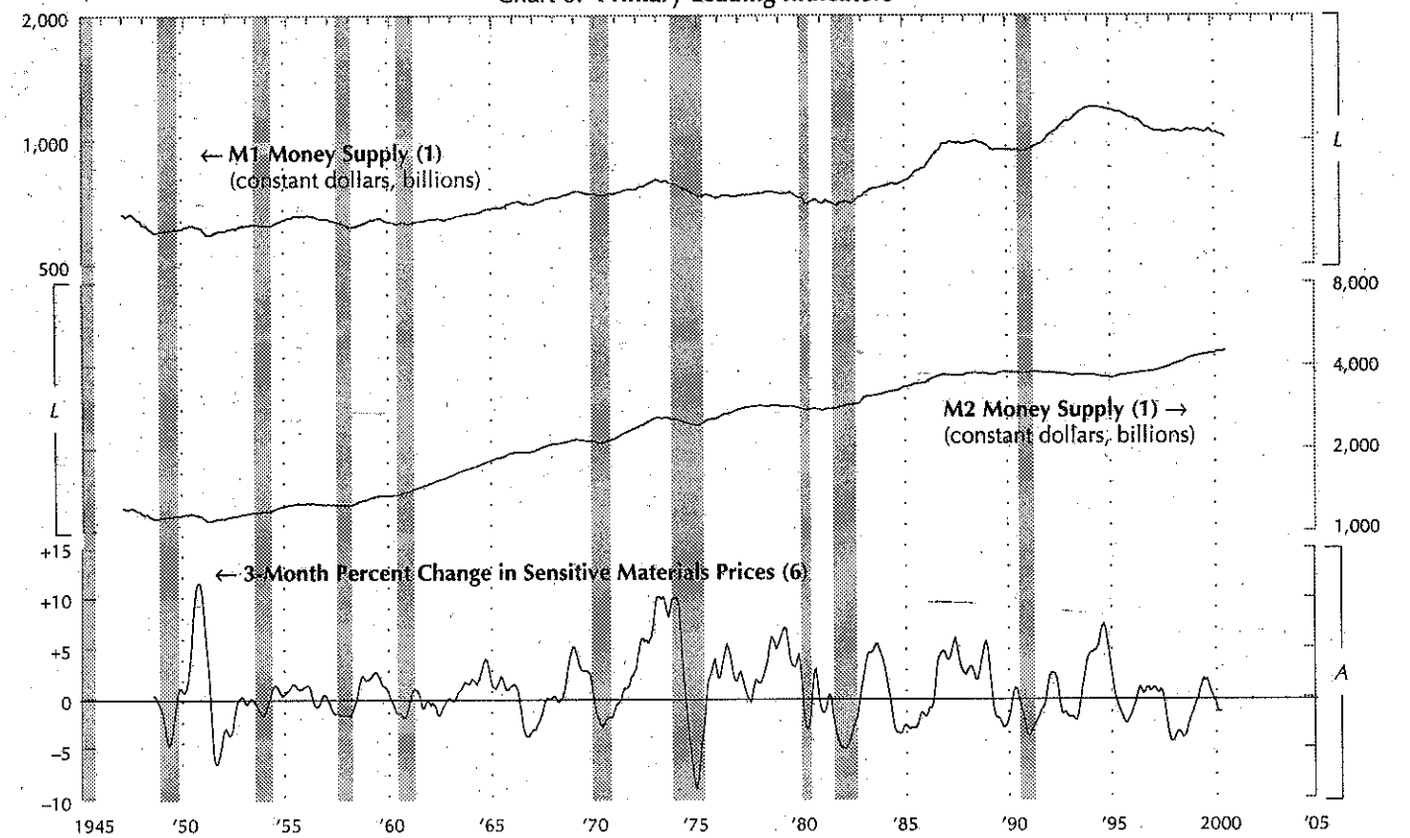
Monthly base data for many series often fluctuate widely, and month-to-month changes in them often are not significant for establishing a continuation of or a change in a cyclical trend. Cyclical trends of such series become clearer after the irregular fluctuations are smoothed. This can be done with the use of a moving average of the monthly (or base) data.

Because the irregular fluctuations in the data for many series differ in average magnitude, the lengths of the moving averages required to smooth each series adequately differ. The base data for some series are so smooth that they need not be averaged. Other series, however, have large irregular monthly changes that require moving averages as long as 6 months in duration.

The length of the moving average for a series is determined statistically by calculating the MCD (months for cyclical dominance) for that series. Briefly, the MCD is an estimate of the time span (number of months) for which cyclical movements of a series are greater than irregular fluctuations. The mathematics used in ascertaining the MCD are quite complex; therefore, we shall not describe them here.

For most economic time series, the MCD is from 1 to 6 months. For the series included among our statistical indicators of business-cycle changes, the range also is from 1 to 6 months. The smaller the MCD, the more

Chart 6: **Primary Leading Indicators**



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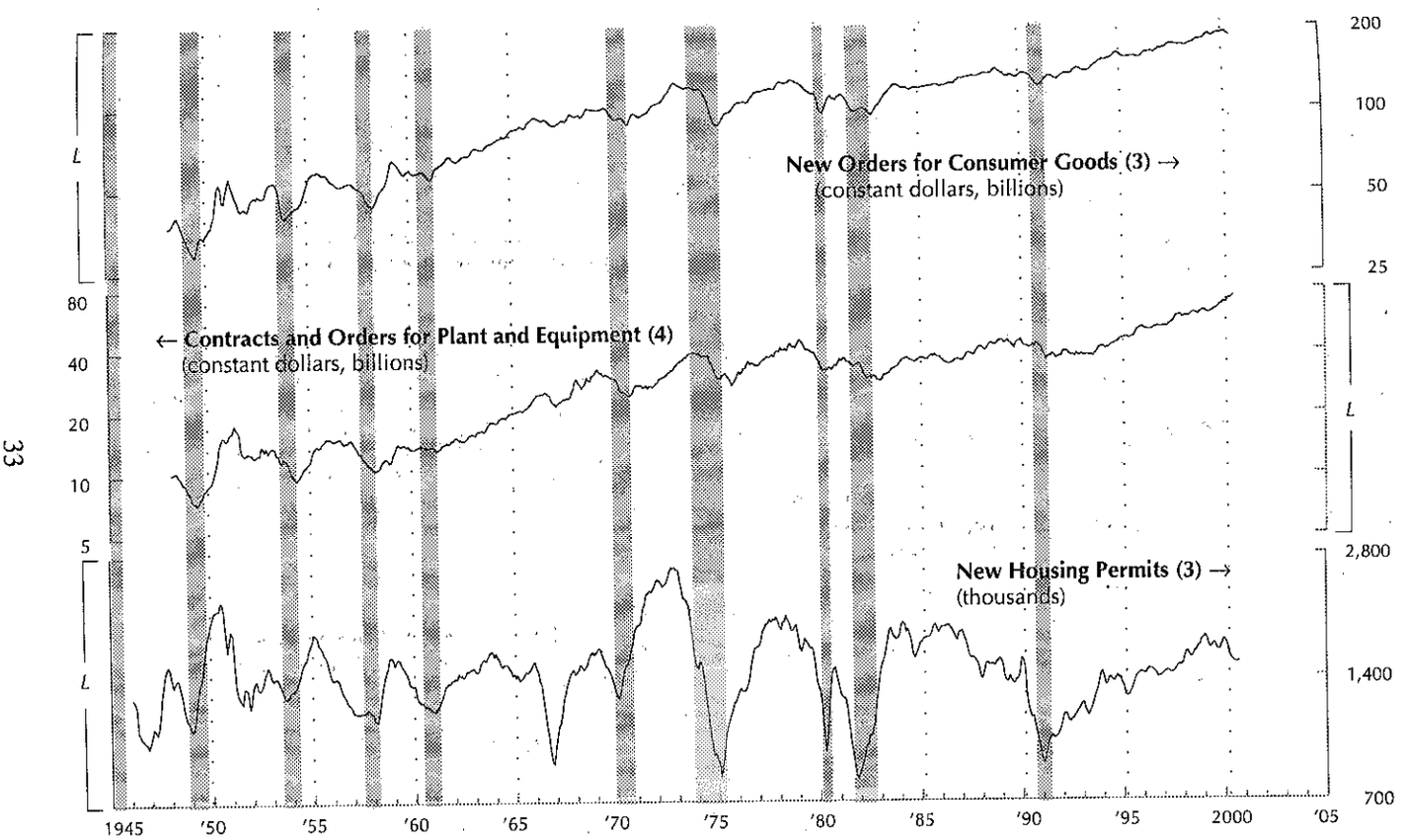

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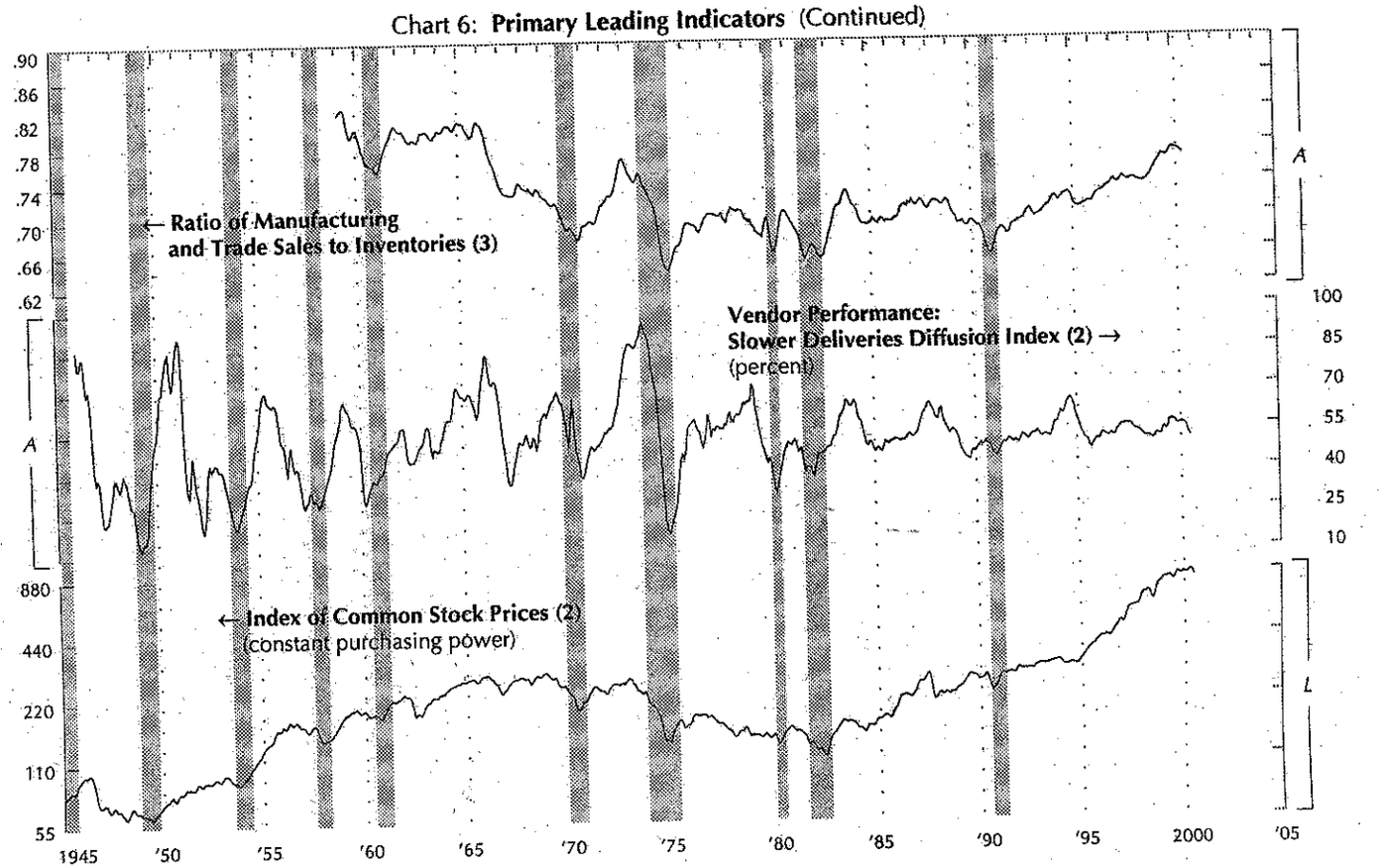
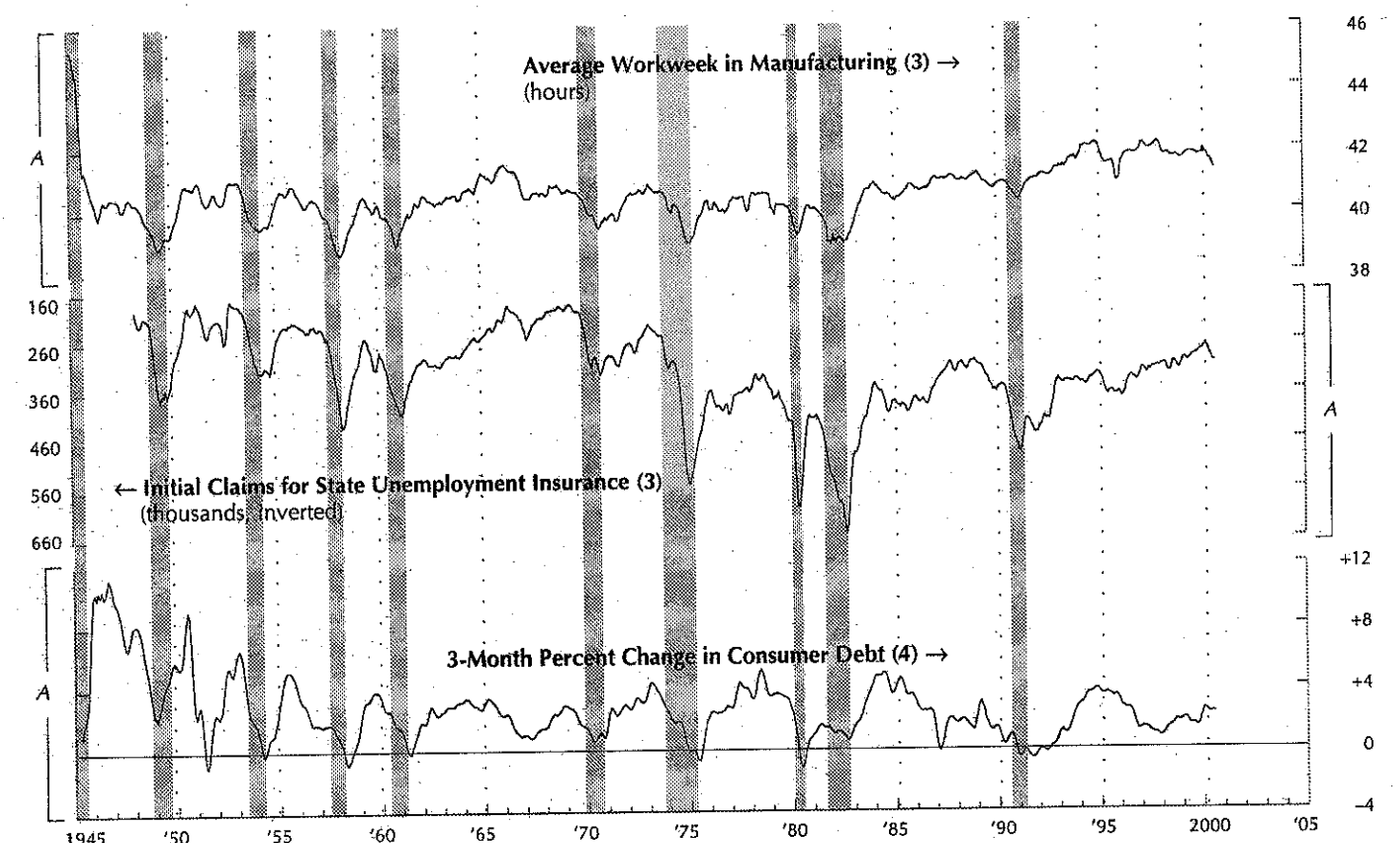
A Arithmetic scale. *L* Logarithmic scale.

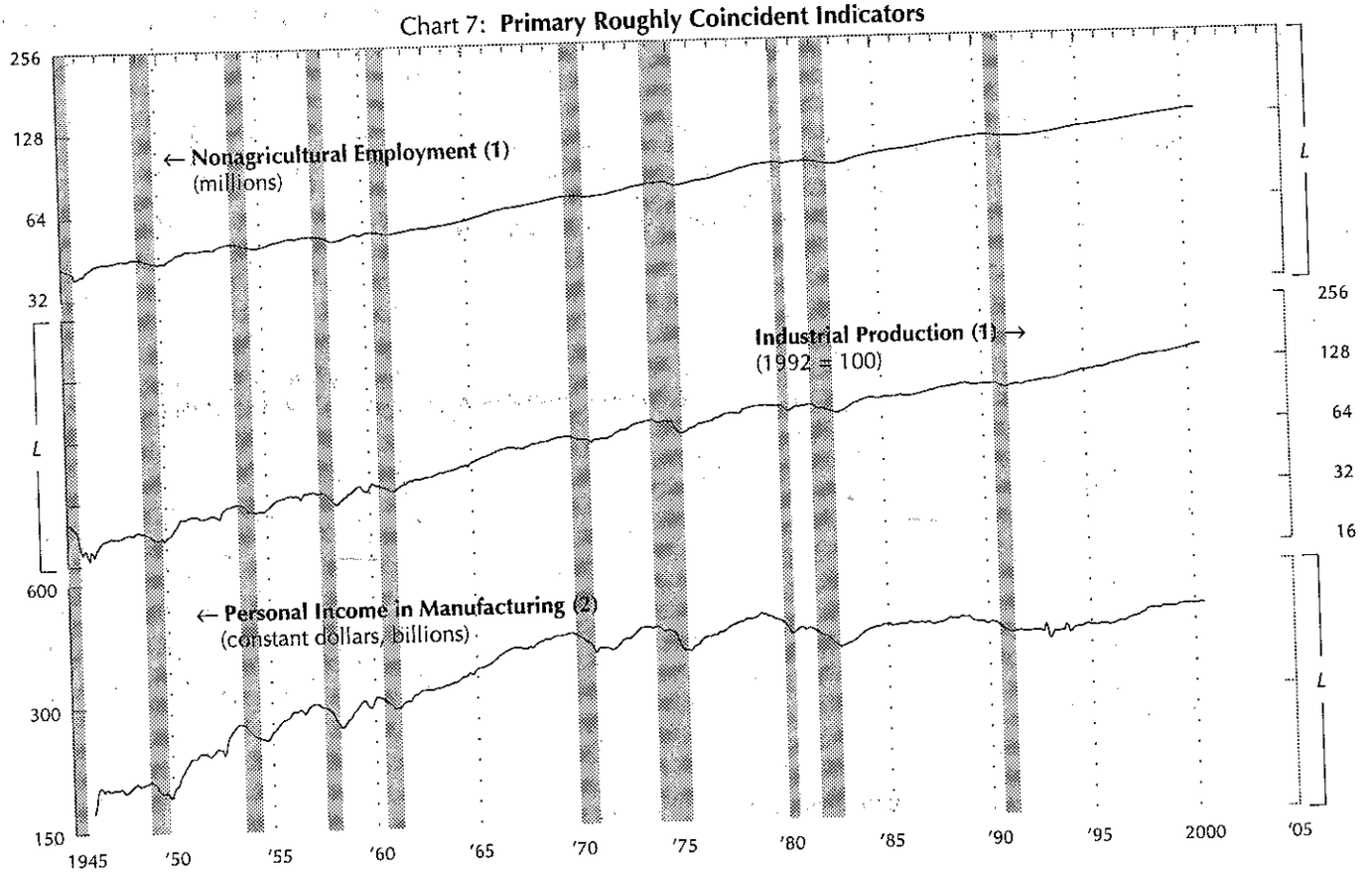
Chart 6: **Primary Leading Indicators** (Continued)

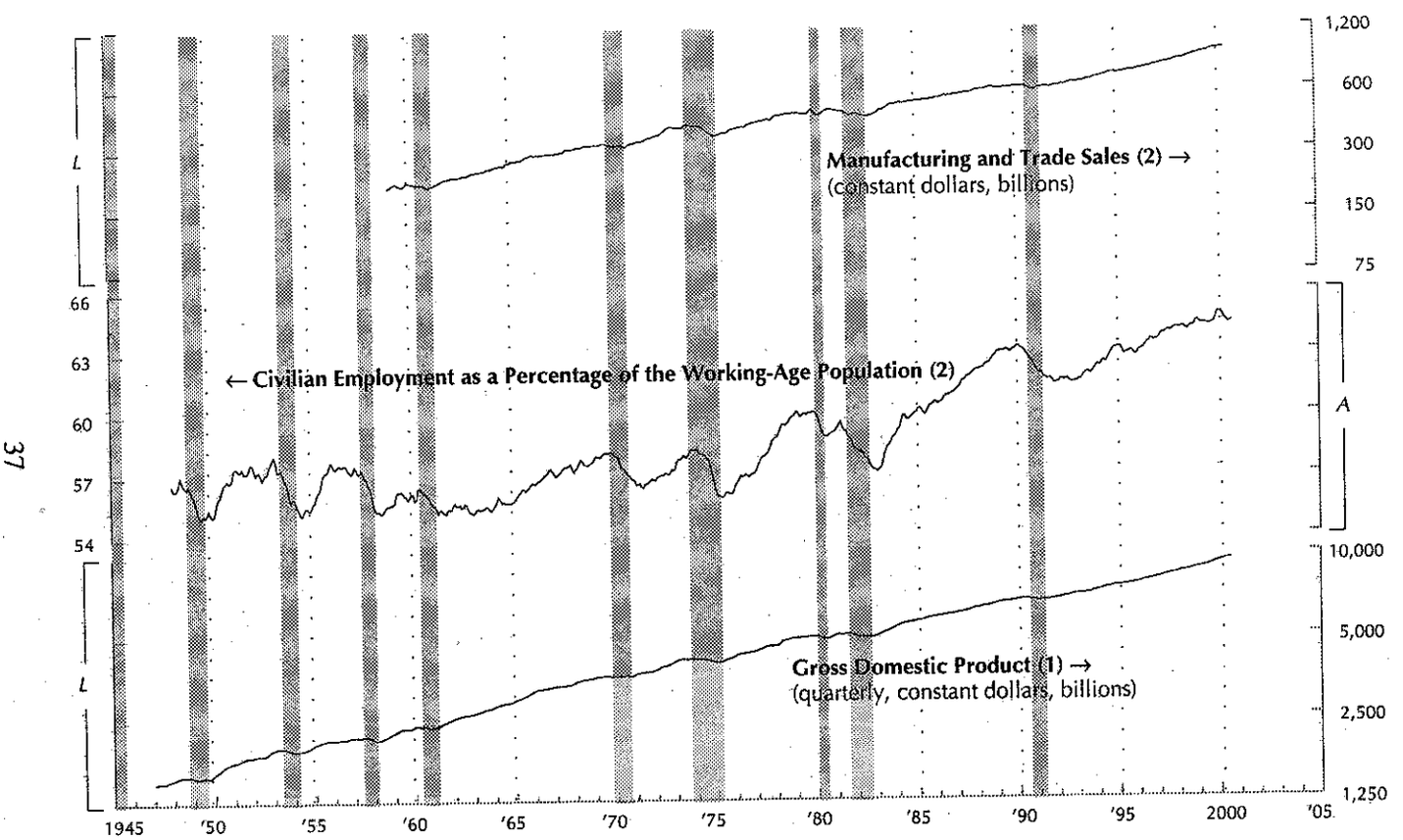




A Arithmetic scale. *L* Logarithmic scale.

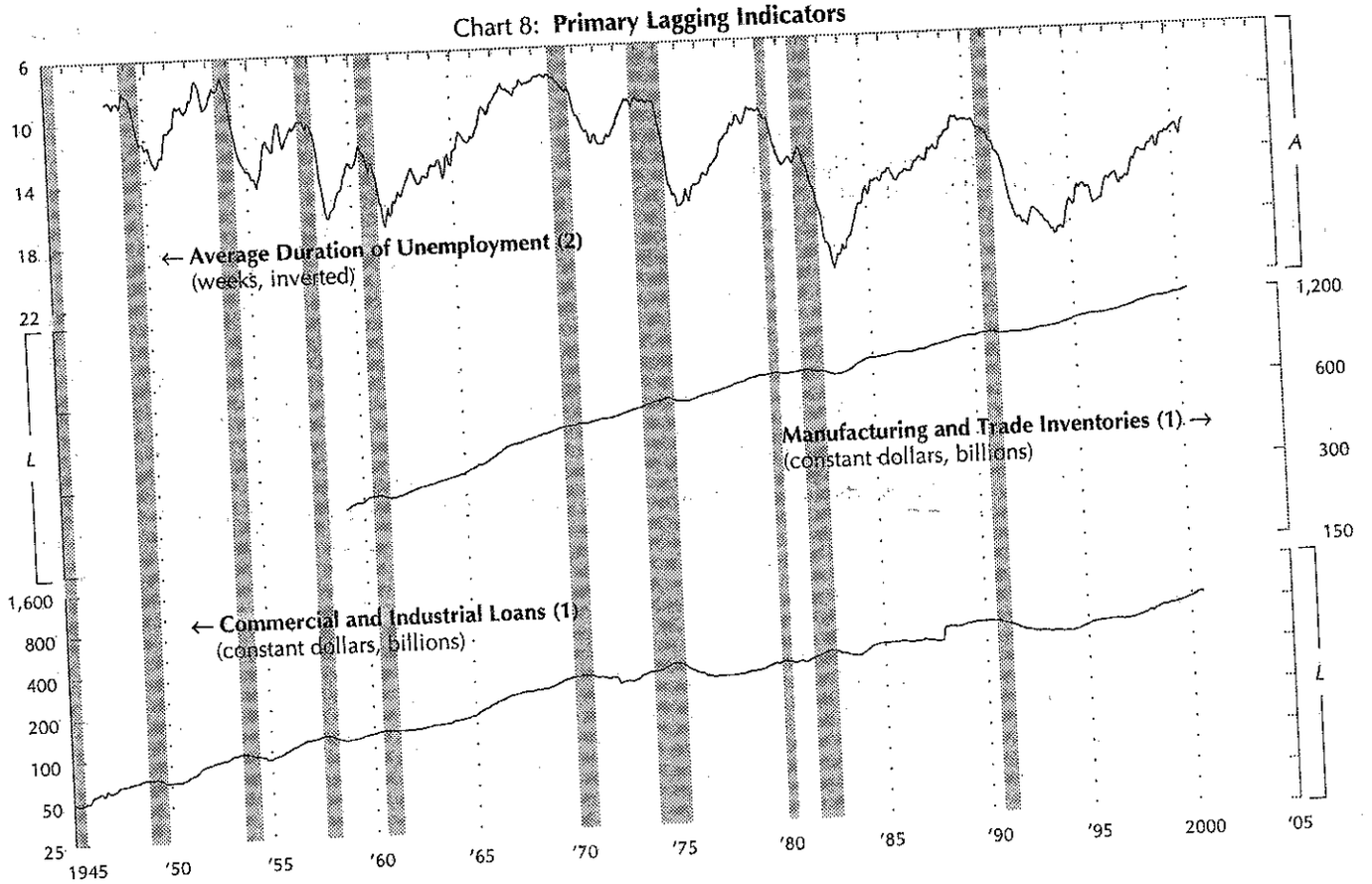
Chart 7: **Primary Roughly Coincident Indicators**

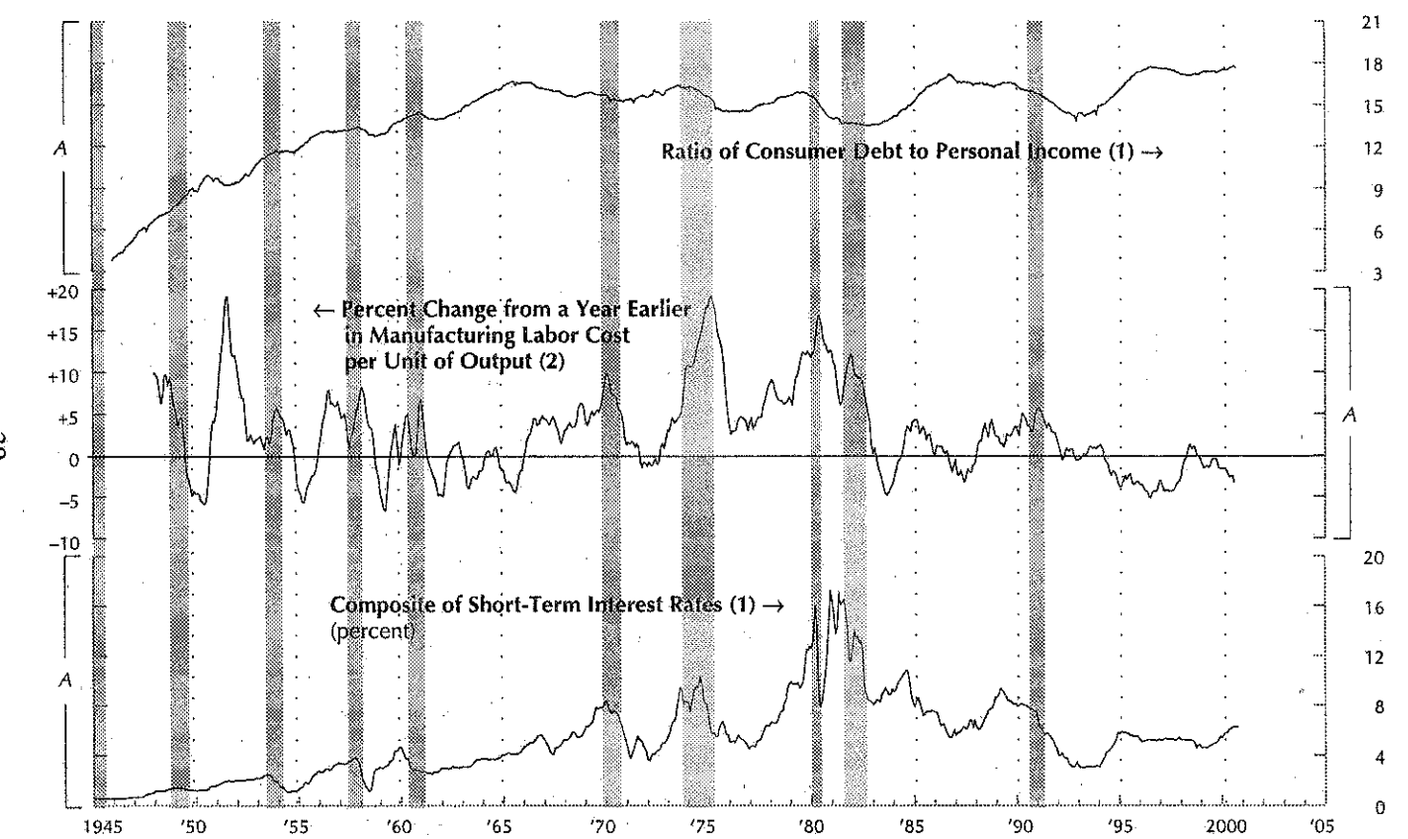




A Arithmetic scale. *L* Logarithmic scale.

Chart 8: **Primary Lagging Indicators**





A Arithmetic scale. *L* Logarithmic scale.

Table 3

Proportions of Occurrences In Which Trends of Various DURATIONS Involved Cyclical Reversals of Business Activity

	Decreasing Trends During Cyclical Expansions — Months of Duration								Increasing Trends During Cyclical Contractions — Months of Duration							
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Primary Leading																
M1 money supply	0.18	0.32	0.40	0.47	0.53	0.57	0.67	0.73	0.24	0.33	0.44	0.62	0.62	0.67	0.73	0.80
M2 money supply	0.20	0.47	0.57	0.67	0.73	0.80	0.80	0.89	0.38	0.62	0.67	0.73	0.80	0.80	0.80	0.89
Chg. in sensitive materials prices	0.36	0.44	0.44	0.47	0.53	0.53	0.53	0.53	0.42	0.44	0.50	0.53	0.62	0.67	0.80	0.80
New orders, consumer goods	0.25	0.30	0.33	0.44	0.44	0.53	0.57	0.73	0.35	0.40	0.40	0.50	0.50	0.62	0.67	0.73
Contracts & orders, p&e	0.18	0.25	0.36	0.42	0.50	0.50	0.53	0.57	0.29	0.35	0.38	0.44	0.50	0.73	0.73	0.80
Housing permits	0.35	0.47	0.47	0.56	0.64	0.82	0.82	0.82	0.27	0.35	0.47	0.57	0.62	0.62	0.73	0.80
Mfg. & trade sales/Inventories	0.44	0.53	0.57	0.67	0.67	0.67	0.73	0.73	0.30	0.38	0.44	0.44	0.50	0.53	0.53	0.62
Vendor performance	0.28	0.35	0.40	0.42	0.47	0.47	0.50	0.57	0.38	0.40	0.57	0.67	0.67	0.73	0.80	0.89
Stock prices	0.26	0.33	0.41	0.47	0.64	0.64	0.69	0.69	0.28	0.33	0.44	0.53	0.62	0.67	0.80	0.80
Average workweek, mfg.	0.24	0.26	0.29	0.41	0.50	0.53	0.56	0.56	0.41	0.53	0.60	0.60	0.69	0.69	0.69	0.69
Initial claims, unemployment ins.*	0.28	0.33	0.40	0.47	0.53	0.57	0.57	0.57	0.31	0.44	0.50	0.62	0.73	0.80	0.89	0.89
Chg. in consumer debt	0.41	0.45	0.47	0.53	0.53	0.69	0.75	0.75	0.33	0.36	0.44	0.47	0.50	0.67	0.73	0.80
Primary Roughly Coincident																
Nonagricultural employment	0.20	0.47	0.69	0.82	1.00	1.00	1.00	1.00	0.50	0.75	0.90	0.90	0.90	1.00	1.00	1.00
Industrial production	0.16	0.28	0.45	0.50	0.56	0.64	0.75	0.75	0.47	0.60	0.64	0.69	0.75	0.75	0.75	0.75
Personal income, mfg.	0.26	0.38	0.47	0.47	0.53	0.69	0.69	0.69	0.47	0.53	0.67	0.67	0.80	0.89	0.89	0.89
Manufacturing & trade sales	0.16	0.25	0.40	0.57	0.62	0.62	0.73	0.73	0.44	0.53	0.62	0.73	0.73	0.80	0.80	0.89
Civilian employment/population	0.19	0.24	0.32	0.38	0.47	0.50	0.53	0.62	0.36	0.50	0.62	0.67	0.73	0.73	0.80	0.89
Gross Domestic Product†	0.50	0.50	0.50	0.75	0.90	1.00	1.00	1.00	0.67	0.67	0.67	0.80	0.80	1.00	1.00	1.00
Primary Lagging																
Average duration of unemployment*	0.18	0.25	0.32	0.39	0.53	0.53	0.53	0.60	0.27	0.33	0.67	1.00	1.00	1.00	1.00	1.00
Manufacturing & trade inventories	0.20	0.47	0.69	0.75	0.90	0.90	0.90	0.90	0.50	0.80	0.89	0.89	0.89	1.00	1.00	1.00
Commercial & industrial loans	0.16	0.25	0.43	0.60	0.75	0.82	0.90	0.90	0.33	0.50	0.56	0.60	0.69	0.75	1.00	1.00
Consumer debt/personal income	0.20	0.36	0.47	0.56	0.60	0.69	0.75	0.82	0.27	0.40	0.62	0.67	0.80	0.80	0.80	1.00
Chg. in labor cost/unit of output	0.27	0.32	0.38	0.40	0.40	0.42	0.44	0.47	0.44	0.53	0.67	0.73	0.73	0.73	0.73	0.73
Composite of short-term interest rates	0.20	0.30	0.45	0.50	0.53	0.60	0.64	0.75	0.29	0.43	0.50	0.53	0.56	0.60	0.64	0.75

Note: All dollar-denominated series are in constant dollars. * Inverted. † Quarterly; duration shown in quarters.

timely (current) is the series. For example, a series with an MCD of 5 requires a 5-month moving average for its cyclical movement to exceed irregular fluctuations. Consequently, the most recent data available reveal cyclical movement at least 3 months after the fact. (A 5-month moving average would be centered on the middle, or third month.) The moving average for a series with an MCD of 1, however, is the same as the base data and is late only insofar as the data are reported after the fact. The MCD for each primary indicator is shown in parentheses in Charts 6-8.

The moving averages are plotted in the same manner as the base data. We focus on the MCDs in our analysis of the cyclical status of a series. (Reproductions of our primary indicators charts appear on pages 32-39.)

Appraisal of Individual Series

To assess the cyclical status of each series, we compare its most recent changes with past patterns. If a series changes in the direction of an already established cyclical trend, there is no doubt that its cyclical status has remained the same. If, however, a series diverges from an identified cyclical trend, we must assess whether the divergence is temporary within a continuation of the identified cyclical trend or is the initial phase of a cyclical reversal.

Readers should note that a 1-month reversal in the moving average of a series does not necessarily establish a new cyclical trend for that series. A trend of several months' duration and of a significant magnitude usually is needed for that. In order to help us assess whether or not the cyclical status of a series has changed, we have compiled two sets of historical relationships. One is the proportions of instances in which past reversed trends in the MCD of various *durations* (in months or quarters) have involved cyclical changes in business activity (Table 3). The other is the proportions of instances in which past reversed trends in the MCD of various *magnitudes* have involved cyclical changes in business activity (Table 4). The tables shown are adaptations of more expanded tables we actually use.

Our proportions are based on historical movements of the series. For the duration proportions we ascertained the number of times that a series, during an identified period of business expansion, decreased for durations of 1, 2, 3, ... 10 months. Then we ascertained the proportions of times that decreasing trends of 1, 2, 3, etc. months' duration proved to be associated with an identified cyclical contraction of business activity. The longer the duration of a decreasing trend, the greater the probability that the downward trend reflects a cyclical contraction. A series does not have to decrease every month to establish a downward trend. It may increase for 1 or more months and still be trending downward during the period. As long as

Table 4

Proportions of Occurrences In Which Trends of Various MAGNITUDES Involved Cyclical Reversals of Business Activity

	Decreasing Trends During Cyclical Expansions								Increasing Trends During Cyclical Contractions							
	Percentage Decrease Larger Than								Percentage Increase Larger Than							
Primary Leading	*0.0*	*0.3*	*0.5*	*1.0*	*3.0*	*5.0*	*10.0*	*20.0*	*0.0*	*0.3*	*0.5*	*1.0*	*3.0*	*5.0*	*10.0*	*20.0*
M1 money supply	0.18	0.33	0.44	0.73	1.00	1.00	1.00	1.00	0.24	0.33	0.50	0.67	1.00	1.00	1.00	1.00
M2 money supply	0.20	0.42	0.57	0.89	1.00	1.00	1.00	1.00	0.38	0.67	0.80	0.89	1.00	1.00	1.00	1.00
Chg. in sensitive materials prices	0.36	0.44	0.47	0.57	0.80	1.00	1.00	1.00	0.42	0.57	0.67	0.80	0.89	1.00	1.00	1.00
New orders, consumer goods	0.25	0.26	0.30	0.38	0.62	0.73	0.89	1.00	0.35	0.35	0.42	0.44	0.62	0.89	0.89	1.00
Contracts & orders, p&e	0.18	0.19	0.20	0.22	0.40	0.57	0.89	1.00	0.29	0.31	0.32	0.33	0.53	0.67	1.00	1.00
Housing permits	0.35	0.39	0.39	0.45	0.60	0.64	0.82	0.90	0.27	0.30	0.33	0.36	0.44	0.57	0.67	0.89
Mfg. & trade sales/inventories	0.44	0.53	0.57	0.67	1.00	1.00	1.00	1.00	0.30	0.35	0.42	0.53	0.73	0.89	1.00	1.00
Vendor performance	0.28	0.30	0.30	0.31	0.38	0.42	0.47	0.73	0.38	0.38	0.38	0.40	0.50	0.67	0.67	0.67
Stock prices	0.26	0.27	0.28	0.32	0.53	0.60	0.75	1.00	0.28	0.30	0.30	0.32	0.47	0.67	0.80	1.00
Average workweek, mfg.	0.24	0.36	0.50	0.75	1.00	1.00	1.00	1.00	0.41	0.60	0.60	0.90	1.00	1.00	1.00	1.00
Initial claims, unemployment ins.*	0.28	0.28	0.31	0.33	0.36	0.47	0.67	0.80	0.31	0.32	0.32	0.40	0.67	0.73	0.89	1.00
Chg. in consumer debt	0.41	0.56	0.57	0.80	1.00	1.00	1.00	1.00	0.33	0.57	0.67	0.80	1.00	1.00	1.00	1.00
Primary Roughly Coincident																
Nonagricultural employment	0.20	0.53	0.60	0.75	1.00	1.00	1.00	1.00	0.50	0.90	0.90	1.00	1.00	1.00	1.00	1.00
Industrial production	0.16	0.21	0.26	0.45	0.64	0.90	1.00	1.00	0.47	0.53	0.60	0.69	1.00	1.00	1.00	1.00
Personal income, mfg.	0.26	0.41	0.47	0.53	0.82	1.00	1.00	1.00	0.47	0.62	0.67	0.89	1.00	1.00	1.00	1.00
Manufacturing & trade sales	0.16	0.24	0.28	0.67	0.73	1.00	1.00	1.00	0.44	0.53	0.57	0.73	1.00	1.00	1.00	1.00
Civilian employment/population	0.19	0.42	0.47	0.89	1.00	1.00	1.00	1.00	0.36	0.62	0.89	1.00	1.00	1.00	1.00	1.00
Gross Domestic Product†	0.50	0.69	0.90	1.00	1.00	1.00	1.00	1.00	0.67	0.80	0.89	1.00	1.00	1.00	1.00	1.00
Primary Lagging																
Average duration of unemployment*	0.18	0.18	0.20	0.23	0.36	0.41	0.82	0.90	0.27	0.27	0.31	0.44	0.73	1.00	1.00	1.00
Manufacturing & trade inventories	0.20	0.56	0.82	1.00	1.00	1.00	1.00	1.00	0.50	0.80	0.89	1.00	1.00	1.00	1.00	1.00
Commercial & industrial loans	0.16	0.23	0.28	0.39	0.75	1.00	1.00	1.00	0.33	0.43	0.47	0.56	0.90	1.00	1.00	1.00
Consumer debt/personal income	0.20	0.30	0.41	0.53	1.00	1.00	1.00	1.00	0.27	0.40	0.62	0.73	1.00	1.00	1.00	1.00
Chg. in labor cost/unit of output	0.27	0.33	0.36	0.40	0.57	0.80	1.00	1.00	0.44	0.50	0.62	0.80	1.00	1.00	1.00	1.00
Composite of short-term interest rates	0.20	0.21	0.23	0.26	0.41	0.60	0.75	0.82	0.29	0.30	0.33	0.35	0.50	0.56	0.56	0.75

Note: All dollar-denominated series are in constant dollars. * Inverted. † Quarterly; magnitude shown in quarters.

the series does not regain the peak from which the decrease began, the trend is considered downward. Table 3 also reflects the proportions for increasing trends during identified cyclical contractions of business activity. Our technique for calculating the proportions during periods of contraction of general business activity is similar to that used during periods of expansion.

To illustrate the use of Table 3, we focus on the first primary leading series, M1 money supply in constant dollars. Under the section "Decreasing Trends During Cyclical Expansions," note that for the months of duration 1 through 8, the proportions are, respectively, 0.18, 0.32, 0.40, 0.47, 0.53, 0.57, 0.67, and 0.73. These data indicate that during all postwar cyclical expansions, a decrease of just 1 month's duration in this series later proved to have signaled a business-cycle contraction in 18 percent of such instances. Decreasing trends of 2 months' duration proved to signal a turn in the cycle in a slightly higher proportion of occurrences, 32 percent. In general, then, decreasing trends of 1 or 2 months are not reliable signs of impending recession during an identified cyclical expansion.

Under the section "Increasing Trends During Cyclical Contractions," one sees that an increasing trend in M1 of 4 months' duration correctly signaled a turn in the business cycle from contraction to expansion in over 60 percent of such events. The data also show that in six of every ten instances (0.62) that this series trended upward for 4 months or more, the business contraction ended and expansion ensued.

In calculating the figures shown in Table 4 for decreasing trends during cyclical expansions, we ascertained the percentage amount by which a series was less than the most recent peak value of that series. We then ascertained the proportions of instances that decreases of such percentage magnitudes in each series later proved to be associated with a new business-cycle contraction, as differentiated from a temporary reversal (false signal of contraction) within a continuing business-cycle expansion. As one would expect, the larger the decrease, the greater the probability that it signaled a cyclical reversal. The percentage decrease was calculated until either a business-cycle contraction was declared or until the decrease was eliminated by a new peak value for the series, which indicated that the preceding decreases were only temporary. The figures in Table 4 for increasing trends during cyclical contractions were based on the same procedure, but applied to percentage increases from recent trough values.

To illustrate the use of Table 4, we focus on the second primary leading series, M2 money supply in constant dollars. The characteristics of this series reveal that when a decrease of greater than 0.3 percent occurred, it signaled a business-cycle contraction in 42 percent of such events. When

the decrease exceeded 3.0 percent, a cyclical contraction occurred 100 percent of the time. M2 exhibited similar behavior during cyclical *contractions*. Percent *increases* of greater than 3.0 percent correctly signaled a reversal in the cycle to expansion in 100 percent of such events.

Because business activity and business cycles are on-going events, the proportions data must be recalculated each time a new peak or trough in the business cycle is identified. The new data are added to all past data of the series and new proportions of expansion or contraction are calculated. The more data incorporated in these tables, the more reliable they should be. Nevertheless, every cycle is unique, and these tables simply reflect historical patterns.

It should be stressed that the indicators are just that — no single series defines the business cycle. Any individual series in a given cycle may peak or trough sooner or later, in comparison with the turning points in economic activity, than would be expected from its role as a leader, coincider, or lagger. Sometimes a given series may not even exhibit any cyclical fluctuation at all throughout a recessionary episode. Although the NBER has attempted to speed up the process, the official dates of the end of expansions and the end of recessions are not announced until several months after the fact, at best, and they may be revised years later.

This is not only why business-cycle analysts must consider many different series but also why judgment (see below) cannot be eliminated from the process. What we look for is an overall pattern to the changes in the indicators. In assessing the cyclical status of a series, our procedures are not always as "cut and dried" as the foregoing discussion may suggest.

A particular problem affects some of the leading series, especially those derived as rates of change or ratios (which therefore tend to fluctuate between extremes during cycles and essentially are without a secular long-term growth trend related to the level of economic activity). Such series often rebound markedly at the start of expansions, only to fluctuate narrowly as the expansion matures. By our procedures, such series will tend to be appraised as contracting cyclically if they fail to make a new high for the cycle after a few months, even if they remain at historically high levels instead of establishing a decreasing trend. As the months pass by, the probability by duration that such a series is contracting will increase to its maximum, which may outweigh a much smaller probability calculated from the magnitude of its decrease from its initial peak.

Thus, in instances where the probability that an indicator is decreasing is large by duration but small by magnitude, we will give more attention to the magnitude of decreases. Eventually, as an initial peak becomes "an-

Table 5
Symbols for Cyclical Statuses

Cyclical Designation	*Symbol*
Clearly expanding	+
Probably expanding	+?
Indeterminate*	?
Probably contracting	–?
Clearly contracting	–

* No discernible status.

cient history," we will begin to appraise the cyclical status of the series on the basis of its more recent fluctuations, *i.e.*, we will treat the recent changes *as if a cycle had occurred* and consider changes in the series from interim troughs or peaks as well as its behavior since the official cycle began.

In hindsight, individual series must be either clearly expanding cyclically or clearly contracting cyclically. In our monthly appraisal of the cyclical status of a series, however, we also may classify a series as probably expanding cyclically, probably contracting cyclically, or indeterminate. The probably expanding and probably contracting designations are used when a series appears to be expanding or contracting cyclically but not by a large enough magnitude and/or long enough duration to make its status clear. If we are unable to assess the cyclical status of a series, we designate it as indeterminate. This situation may arise if the proportions data indicate that there is a nearly equal chance that the series is expanding or contracting cyclically. Table 5 lists each cyclical designation and the symbol for that designation used in our statistical indicators table (Table 6 on p. 46).

Group Percentage Expanding

Once each month in our *Research Reports*, we indicate the percentage of each group (leaders, roughly coincident, and laggers) of primary indicators of business-cycle changes that we have appraised as expanding cyclically. These percentages are calculated by adding the number of series in each group appraised as expanding or probably expanding cyclically, dividing that figure by the number of series in the group for which a cyclical status is evident, and multiplying the result by 100. Series for which the cyclical status is indeterminate are disregarded. For example, if nine of the twelve primary leaders are clearly or probably expanding cyclically, one is clearly or probably contracting, and the cyclical statuses of two series are indeterminate, we divide nine by ten (total number of primary leaders for which the cyclical status is apparent), which equals 0.90. This number multiplied by 100 equals 90. Therefore, we would report that 90 percent of the primary leading indicators with an apparent cyclical trend are expanding.

The percentage of a particular group expanding cyclically during a given month is important, as are the relationships of each group to the other groups and to past percentages. These relationships are discussed below.

Our Appraisal of the Cyclical Trend of Business Activity

In our analysis of the cyclical trend of business activity we study the three groups of indicators individually and in relation to each other, beginning with the leading series. Although a cyclical turn in the majority of the primary leaders may be a false indication of a turn in general business activity, since 1947 no cyclical turn in business activity has occurred without a prior turn in such leaders. Therefore, in watching for business-cycle changes, the leaders must be studied regularly.

Table 6

Statistical Indicators of Business-Cycle Changes

Change in Base Data					*Cyclical Status*		
Sep.	*Oct.*	*Nov.*	*Dec.*	***Primary Leading Indicators***	*Sep.*	*Oct.*	*Nov.*
-	-	-		M1 money supply	-	-	-
+	+	+		M2 money supply	+	+	+
-	+	+		Change in sensitive materials prices	?	?	?
-	+	+		New orders for consumer goods	+	+?	+?
-	+	+		Contracts and orders for plant and equipment	+	+	+
-	-	+	+	New housing permits	-	-	-
-	+			Ratio of manufacturing and trade sales to inventories	+?	?	?
-	-	-	+	Vendor performance	?	?	?
+	+	-	-	Index of common stock prices (constant purchasing power)	+	+	+?
+	-	-	+	Average workweek in manufacturing	-?	-	-
+	-	+		Initial claims for unemployment insurance (inverted)	+?	?	?
+	+	-		Change in consumer debt	?	?	?
				Percentage expanding cyclically	*67*	*57*	*57*
				Primary Roughly Coincident Indicators			
-	-	+	+	Nonagricultural employment	+?	+	+
-	+	+	-	Index of industrial production	+	+	+
+	-	-		Personal income in manufacturing	+?	+	+?
-	+			Manufacturing and trade sales	+	+	+
-	+	+	+	Civilian employment to population ratio	?	?	?
+	+	+		Gross domestic product (quarterly)	+	+	+
				Percentage expanding cyclically	*100*	*100*	*100*
				Primary Lagging Indicators			
-	+	+	-	Average duration of unemployment (inverted)	+?	+	+
+	+			Manufacturing and trade inventories	+	+	+
+	+	-		Commercial and industrial loans	+	+	+
+	+	-		Ratio of consumer debt to personal income	+	+	+
+	-	-		Change in labor cost per unit of output, manufacturing	-	-	-
+	+	-	+	Composite of short-term interest rates	+	+	+
				Percentage expanding cyclically	*83*	*83*	*83*

nc No change. ʳ Revised.

Under "Change in Base Data," plus and minus signs indicate increases and decreases from the previous month or quarter and blank spaces indicate data not yet available. Under "Cyclical Status," plus and minus signs indicate expansions or contractions of each series as currently appraised; question marks indicate doubtful status when shown with another sign and indeterminate status when standing alone.

A decrease in the primary leading indicators from 100 percent expanding cyclically to a lower percentage during 1 month, or even for several months, does not necessarily indicate an impending contraction in general business activity. Individual series may decrease temporarily for a variety of reasons unrelated to a cyclical contraction of business activity, such as major strikes, the weather, transportation problems, or natural disasters. Only when less than 50 percent of the primary leaders are appraised as expanding cyclically do we suggest that a contraction in business activity is *probable*.

A few months (but sometimes as much as a year) after the percentage of primary leaders expanding cyclically has decreased to less than 50, the percentage of primary roughly coincident series expanding cyclically usually will begin to decrease. Decreases in the percentage of roughly coincident series expanding cyclically, and further decreases in the percentage of the leaders expanding, would tend to support the expectation that a contraction of general business activity was under way. Yet, not until the percentage of primary roughly coincident series decreased to less than 50 would the assertion that a business contraction *probably has begun* be warranted.

Confirmation of such would be needed from the primary laggers. If the lagging series continue to expand cyclically without apparent abatement, the reversal of the trend of general business activity may be short-lived and, therefore, not a bona fide cyclical contraction.

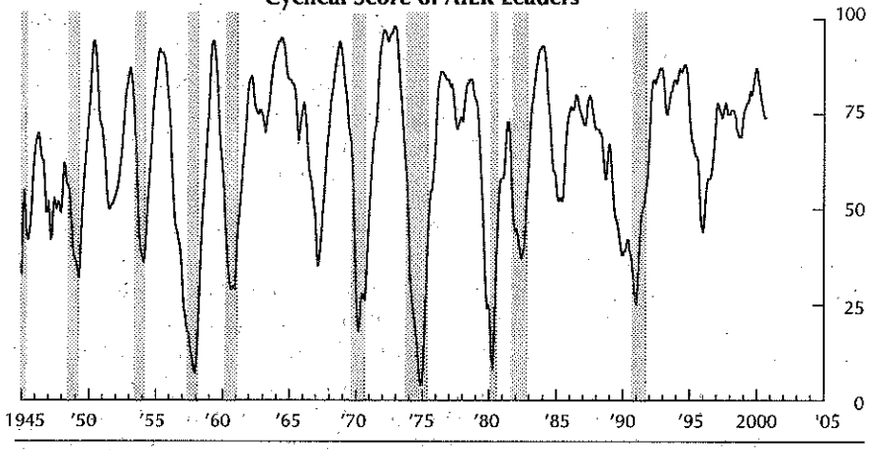
As can be seen in the percentages of AIER primary indicators expanding chart (Chart 4 on p. 20), the primary leaders signaled possible contractions of general business activity on several occasions in the early 1960s. The roughly coincident and lagging series, however, indicated little or no confirmation. Since then, the NBER has designated four distinct periods during the 1960s as "growth cycles" rather than business recessions. (See the glossary of terms for a description of "growth cycle.")

We outlined above our technique for analyzing the statistical indicators during periods that business activity changes from cyclical expansion to cyclical contraction. Once a cyclical contraction of general business activity has been identified, a similar method of evaluation is used for the opposite type of change. In both instances, the primary leading indicators generally will turn first, followed by the primary roughly coincident series, and then confirmed by the primary lagging series.

The Cyclical Score

Although the procedure for calculating the percentage of leaders expanding is straightforward, it does not allow for any "shades of gray." Each series must be accorded a specific cyclical status each month and a series reaching a new high for the cycle has the same "weight" as one that

Chart 9
Cyclical Score of AIER Leaders



has decreased for several months and is on the verge of an indeterminate status.

As a result, AIER developed an alternative measure of the primary leading indicators called the "cyclical score," which is plotted in Chart 9. Although it too theoretically can fluctuate between 0 and 100, it differs from the percent expanding series in several respects. The cyclical score is a purely arithmetical calculation that does not reflect the judgments of AIER's staff in any way. Also, it is based on the current list of primary leaders each month. This means that the data for, say, August 1972, reflect all historical revisions and may include series that were not on the list of primary leaders then. Consequently, the historical record of the cyclical score may itself be revised whenever a series is revised or one series is dropped and another substituted. The percentage expanding series is, in contrast, a record of the monthly findings of AIER's staff based on the leading series then in use and then available. The percent expanding series is never revised.

In the calculation of the cyclical score, those series that are at a new high in an established uptrend are given a score of 100, and those at a new low in an established downtrend are given a score of 0. The score for other series will depend on the extent and duration of the reversals of their most recent trend. The "cyclical score" is simply the average of the scores of the 12 individual leading series. In this way, it allows for something other than an all or nothing contribution of a given series to the final result.

Moreover, in an effort to reduce the incidence of "false signals," the calculation of the overall score from the individual series provides for a heavier weighting of increases than decreases. Of course, it should be

understood that this procedure cannot guarantee that the series will perform as well during the next cycle as it has in the past — if it does not, then the procedures will be revised.

As with the percentage expanding series, the cyclical score can range from 0 to 100. A score below 50 indicates that a recession is probable. We rely on the cyclical score primarily to supplement the percentage expanding series. For example, if the percentage of leaders appraised as expanding indicates that a recession is probable, but the cyclical score of the leaders does not, we would be somewhat hesitant in asserting that a recession is imminent. On the other hand, if both series were to decrease to less than 50, we would be somewhat more confident in offering such an appraisal. In addition, if the cyclical statuses of many indicators were indeterminate, the percent of leaders expanding—which ignores such series entirely—could render a misleading outlook. Thus, the cyclical score, which takes into account all twelve series regardless of their appraisal, would play an important role in our assessment of conditions.

Evidence Supplementing the Statistical Indicators

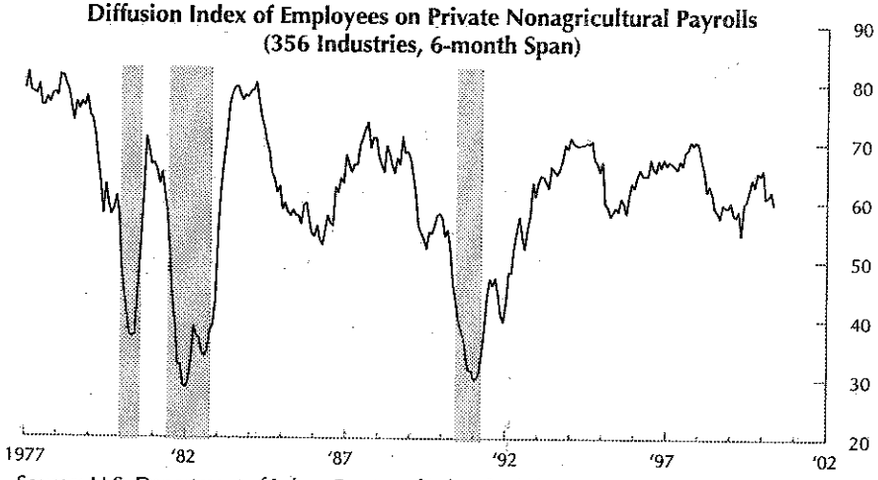
Earlier we pointed out that any analysis of the statistical indicators should not be used independently of everything else when one attempts to forecast the trend of business activity. Our indicators are simply tools that one can use in addition to other information. Improved results can be achieved if the trend of the indicators is interpreted with experienced judgment and in light of other relevant evidence. In addition to the TCB composite index of leaders mentioned above, we regularly inspect three other types of relevant evidence: diffusion indexes, recovery comparisons, and recession comparisons.

Diffusion indexes are derived from combinations of series reflecting similar aspects of economic activity. How the individual components of such a combination move over a given time span is summarized by a diffusion index, which indicates the percentage of the components that is rising. Therefore, unlike the composite indexes mentioned previously, a diffusion index does not measure the aggregate movement of the group. Rather, it measures only the percentage of the total that increased during the month. If 20 series comprise a diffusion index and 15 of them increased during a particular month, the index value would be 75 ($15 \div 20 = .75 \times 100 = 75$) for that month. Whether the magnitude of the increases in individual series was large or small would not affect the level of the index.

Cyclical changes in diffusion indexes usually precede those of composite indexes of the aggregate at cyclical turning points. Yet, the disadvantage of using these indexes as leading series is that they usually are highly

Chart 10

Diffusion Index of Employees on Private Nonagricultural Payrolls (356 Industries, 6-month Span)



Source: U.S. Department of Labor, Bureau of Labor Statistics.

erratic, and long moving averages (6 to 9 months) often are needed to differentiate cyclical movements from irregular ones. These long moving averages reduce the lead time of apparent cyclical changes in diffusion indexes over that of other ways of looking at the statistical indicators. Nevertheless, diffusion indexes are useful checks on the signals of the other approaches.

In that diffusion indexes measure the extent to which a contraction or an expansion has spread throughout the economy, they also are useful in determining the approximate date when the balance turned from expansion to contraction (or vice versa). In the later stages of an expansion in economic activity, for example, the number of sectors that continue to expand usually diminishes. At about the time that aggregate business activity reaches its zenith, there usually will be a rough balance between expanding and contracting forces. Afterwards, the contracting forces will dominate. Diffusion indexes reveal this changing balance in a variety of ways, depending on their composition and construction. We have found two indexes of different composition useful in assisting us to forecast the trend in business-cycle activity. They are depicted in Charts 10 and 11.

Chart 10 shows the diffusion index of employees on private nonagricultural payrolls. It represents the percentage of 356 industries employing more people than they did 6 months earlier plus one-half of the industries with unchanged employment. Historically, sharp increases in this series from cyclical lows were accompanied by a recovery from recession.

The ratio of the composite of roughly coincident series to the composite

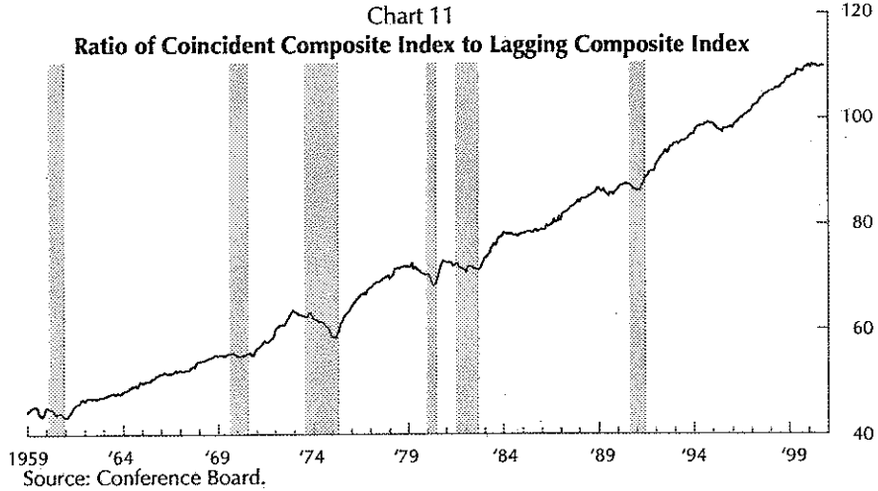
of lagging series compiled by the BEA is shown in Chart 11. This series has been useful in helping to identify business-cycle peaks and troughs, although its lead time has been too short to help identify the troughs in advance. When this series increased for a few months during an identified business-cycle contraction, expansion followed in seven of the nine postwar instances. The two false signals occurred during the recessions beginning in 1948 (not shown) and 1981. Similarly, although the series has given a few false signals (such as the signal in 1984 and 1995), prior to a sharp slowdown, but not a full-fledged recession in economic activity, it has never failed to signal a recession.

Charts 12a and 12b illustrate a method we use for comparing recovery patterns from recession. These comparisons are useful, at turning points off of troughs, for gauging if an evolving pattern of a series reflects cyclical recovery by virtue of its being similar or dissimilar to the typical path that the series might take when recoveries occurred.

For example, Chart 12a shows recovery comparisons similar to what we might have used in 1991 had we assumed a trough occurred the month *prior* to the actual trough of March 1991. By assuming that February *was* the trough of the business cycle, we could compare the behavior of those series with their behavior at other cyclical turning points. At that time, one of the series, manufacturing and trade sales, appeared to be possibly expanding. However, the industrial production series and the personal income in manufacturing series, which turn very sharply at cyclical troughs, showed no indications of having troughed. We would have concluded on the basis of the February data that February 1991 was not the trough of the 1990-91 recession. As subsequent events showed, March 1991 was the

Chart 11

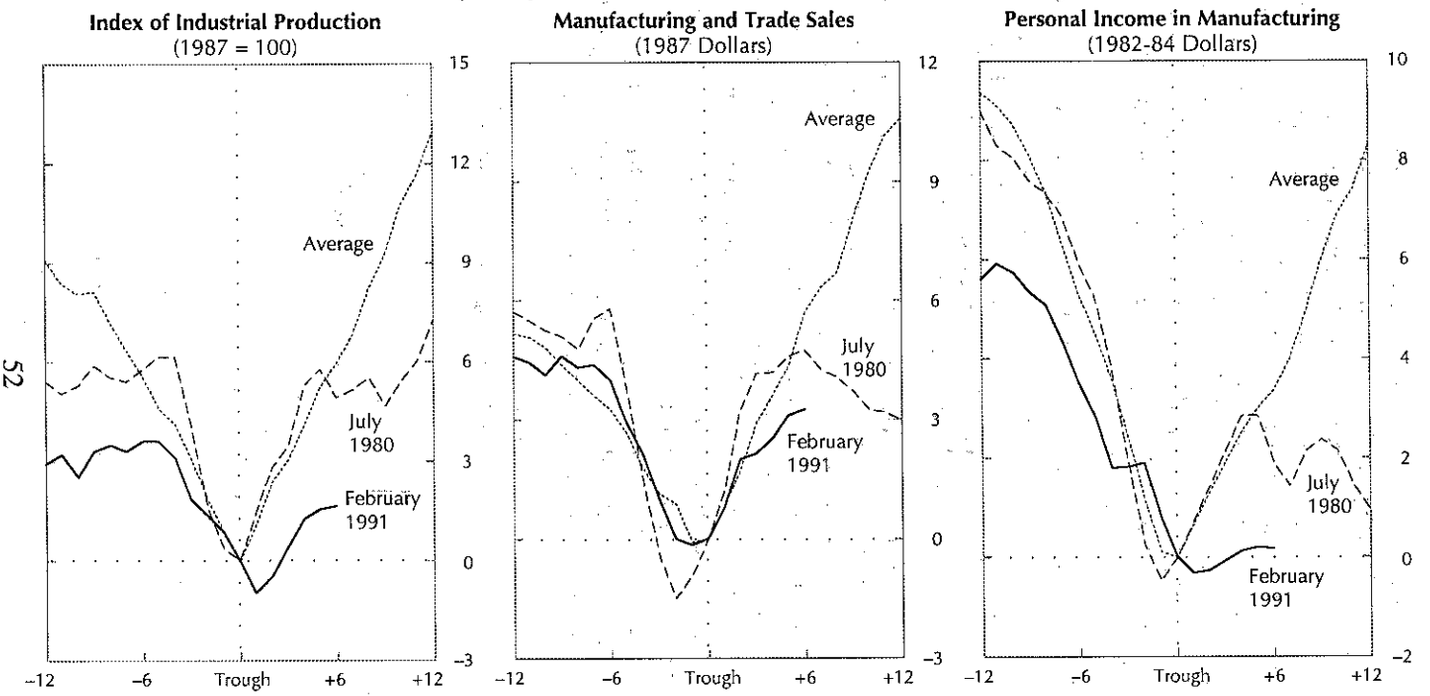
Ratio of Coincident Composite Index to Lagging Composite Index



Source: Conference Board.

Chart 12a

Recovery Comparisons for Selected Measures of Economic Activity

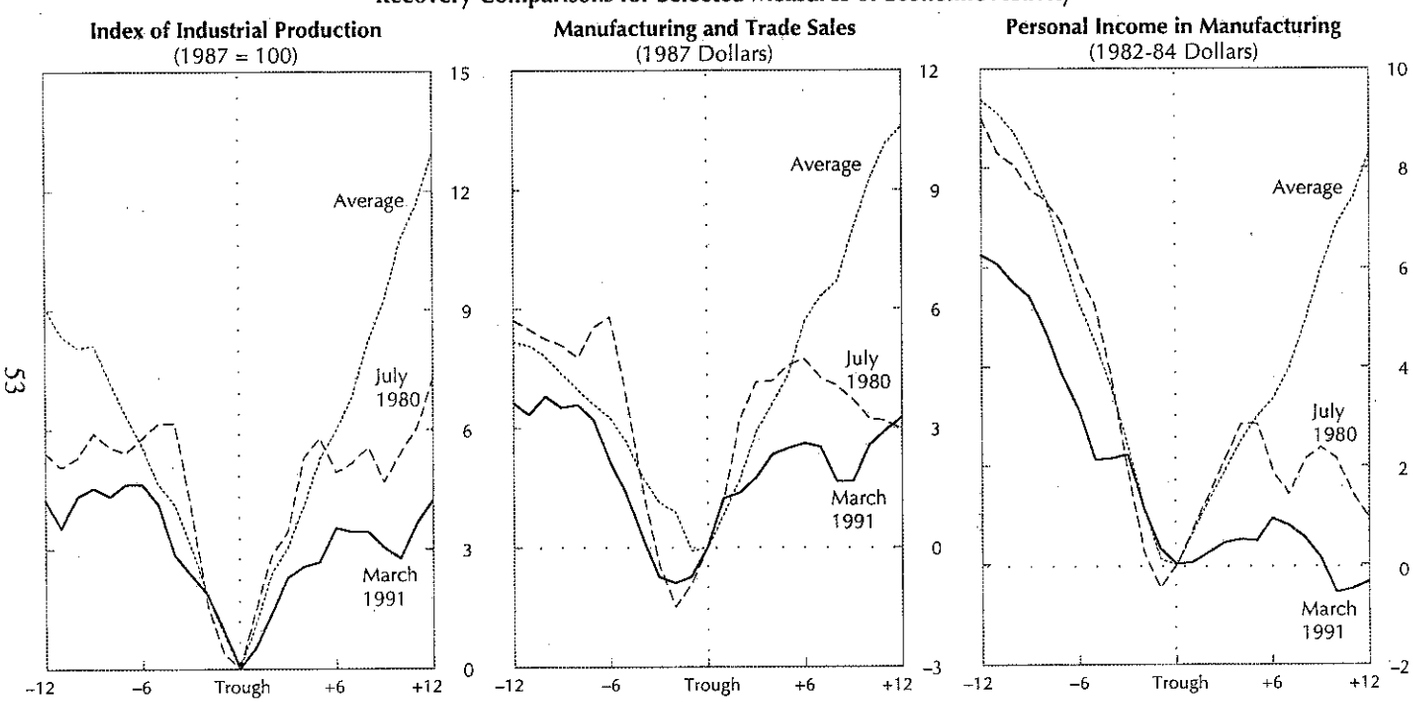


Note: The averages were calculated from the nine completed postwar recessionary periods by dropping the highest, the lowest, and the most-recent figures for each comparable month and taking a mean of the remaining six figures. The curves show the percentage differences (vertical scale) in the series' values from the value of that series at the trough of the respective business cycle. These differences are shown for each of the 12 months before and after the business-cycle trough.

Postwar troughs occurred: October 1949, May 1954, April, 1958, February 1961, November 1970, March 1975, July 1980, November 1982, and March 1991.

Chart 12b

Recovery Comparisons for Selected Measures of Economic Activity



Note: The averages were calculated from the nine completed postwar recessionary periods by dropping the highest, the lowest, and the most-recent figures for each comparable month and taking a mean of the remaining six figures. The curves show the percentage differences (vertical scale) in the series' values from the value of that series at the trough of the respective business cycle. These differences are shown for each of the 12 months before and after the business-cycle trough.

Postwar troughs occurred: October 1949, May 1954, April, 1958, February 1961, November 1970, March 1975, July 1980, November 1982, and March 1991.

Chart 13

Recession Comparisons for Selected Employment Series

Note: The averages were calculated from the nine completed postwar recessionary periods by dropping the highest, the lowest, and the most-recent figures for each comparable month and taking a mean of the remaining six figures. The curves show the percentage differences (vertical scale) in the series' values from the value of that series at the peak of the respective business cycle. These differences are shown for each of the 6 months before and 18 months after the business-cycle peak. Postwar peaks occurred: November 1948, July 1953, August 1957, April 1960, December 1969, November 1973, January 1980, July 1981, and July 1990.

Table 7

Average Monthly Lead Times of Supporting Series

Series	*Peaks*	*Troughs*
The Conference Board's composite index of leaders (Chart 5)	–9.0	–4.0
Diffusion index of employees on nonagricultural payrolls (Chart 10)	–27.8	–4.8
Ratio of coincidents to laggers (Chart 11)	–18.3	–2.3

actual trough. Chart 12b shows the recovery comparisons for the same series plotted at their actual troughs for the 12 months before and after the cyclical turning point. During the early stages of the current expansion, industrial production and manufacturing and trade sales closely followed the experience of prior expansions, while personal income growth was weak compared with past recoveries. (Apparent differences from the series plotted in Chart 12a are due to revisions in the data.)

Chart 13 portrays patterns of recession (rather than recovery) for selected employment series. These recession comparison charts show how particular series changed 6 months before the "official" business-cycle peak and 18 months after its occurrence. Such comparisons are particularly useful for assessing the relative severity of each new recession, which media reports almost invariably portray in drastic terms. For example, the decline in the average workweek series during the 1990-91 recession was much milder than its contraction in the 1980 recession. Although the decrease in the average workweek of manufacturing workers during the 1980 recession was deeper than average, it also was much shorter than average.

Much of the information discussed above is more useful for forecasting imminent peaks than imminent troughs. As Table 7 shows, the supplemental evidence examined has had a longer lead time at peaks than at troughs. While we fully realize that the particular supplemental series analyzed here are not the only series one could choose to predict cyclical turns, the problems of early trough identification hold for most of the others as well. At troughs, the most that reasonably can be expected of the leaders is to call the turn just about the month it happens.

Judgment

Analysis of statistical indicators of business-cycle changes is a procedure for organizing some historical events in a way that is useful for ascertaining the current cyclical trend of economic activity and its probable future direction. This approach reduces the subjective aspect of analyzing business cycles, but it does not eliminate it. During almost every

phase of analysis of the indicators, subjective evaluation is required to some degree. The specific series used as indicators may trend one way for months at a time, or magnitudes of fluctuations in the specific series might be large over short periods of time without a corresponding business-cycle change occurring. In assessing the status of a series, a determination must be made whether these fluctuations are cyclical or temporary. This evaluation necessarily involves judgment. Compilation of our proportions data, itself, involves judgment, because specific peaks and troughs are not always clear, yet the analyst must choose some point as the specific peak or trough from which to calculate changes.

We stress again that our use of the statistical indicators of business-cycle changes constitutes one tool available for helping to forecast the near-future cyclical trend of business activity. This technique should be used in conjunction with other available pertinent data. Substantial judgment on the part of the analyst is necessary.

IV.
DESCRIPTION OF SERIES

IN this chapter we present the source of each primary statistical indicator, its composition, and we comment briefly on pertinent aspects of each series. These primary series reflect developments in a number of important economic activities and, in our judgment, they are the most useful for assessing underlying trends as well as imminent changes in the business cycle.

Primary Leading Indicators

M1 money supply, 1996 dollars: Board of Governors of the Federal Reserve System (Series H.6). This series is an estimate of constant-dollar money balances, consisting of the money stock (M1). M1 consists of (1) currency outside the Treasury, Federal Reserve banks, and the vaults of commercial banks; (2) traveler's checks of nonbank issuers; (3) demand deposits at all commercial banks other than those due to domestic banks, the U.S. Government, and foreign banks and official institutions less cash items in the process of collection and Federal Reserve float; and (4) other checkable deposits (OCDs), consisting of negotiable order of withdrawal (NOW) and automatic transfer accounts (ATS), at depository institutions other than credit unions, and of credit union share draft accounts and demand deposits at thrift institutions. The currency and demand deposit components exclude the amount of vault cash and demand deposits held by thrift institutions to service their OCD liabilities. Deflated with Personal Consumption Expenditures index.

M2 money supply, 1996 dollars: Board of Governors of the Federal Reserve System (Series H.6). This series is a more comprehensive estimate of constant-dollar money balances than M1. M2 consists of (1) M1 (see above); plus (2) savings deposits (including money market deposit accounts); and (3) balances in retail money market mutual funds.

Percent change from 3 months earlier in sensitive materials prices, 1992=100: The Conference Board (BCI Series 99). This series is the percent change in a composite price index for 17 separate commodities and industrial materials used in production from its level 3 months earlier. The materials are raw, crude, and intermediate commodities used by producers in the initial production stage. They include various metal scraps, cotton, wool, burlap, cattle hides, lumber, rubber, tallow, and more. Presumably, the markets for these commodities are among the first to be influenced by changes in business conditions. Oil and petroleum goods are not included in the index. Data is seasonally adjusted.

Value of manufacturers' new orders for consumer goods and materials, 1996 dollars: The Conference Board (BCI Series 08). This series consists of new orders for durable goods, other than capital goods and defense products—i.e., goods used primarily by consumers. Adjustment of the data for changes in prices is done by the source separately for each of the industries included in this series with appropriate combinations of producer price indexes.

Contracts and orders for plant and equipment, 1996 dollars: The Conference Board (BCI Series 20). This series measures the value of new contracts awarded to building, public works, and utilities contractors and of new orders received by manufacturers of nondefense capital goods industries. Deflating is done by the source.

New private housing units authorized by local building permits: U.S. Department of Commerce, Bureau of the Census (C20). This series measures the month-to-month changes in the number of housing units authorized by local permit-issuing places. The data relate only to the issuance of permits and not to the start of actual construction; in some instances, permits are not used at all and some are allowed to lapse. Cyclical changes in this series usually precede those of other construction series, such as the number of houses started, residential contract awards, and residential construction.

Ratio, constant-dollar manufacturing and trade sales to constant-dollar manufacturing and trade inventories: The Bureau of Economic Analysis. This series is a ratio of manufacturing and trade sales, a primary roughly coincident series (see below), and manufacturing and trade inventories, a primary lagging series (see below).

Vendor performance, slower deliveries diffusion index (percent of purchasing managers reporting slower deliveries): National Association of Purchasing Management and Purchasing Management Association of Chicago. This series shows the percentage of purchasing agents who experience slower deliveries in the current month compared with the rate during the preceding month. It reflects the volume of business being handled by the suppliers of these firms, with slower deliveries indicating a higher volume of business. (Slower deliveries also result from shortages of materials.) The series shows the percentage of companies reporting slower deliveries and is computed by summing the published percentage reporting slower deliveries plus one-half of the percentage reporting deliveries unchanged from those during the preceding month. From 1976 on the data are derived from a national survey of purchasing agents; prior to 1976 the data are based on a survey of agents in the greater Chicago area.

Index of common stocks prices (1941-43=10), 1982-84 dollars: Data are from daily quotations in newspapers and financial periodicals. This series

gives monthly averages of daily indexes of closing prices from Standard & Poor's 500 stock composite index. Among other things, changes in stocks prices reflect changes in investment psychology and investors' opinions of profit prospects. AIER deflates this series using the Consumer Price Index (1982-84=100).

Average workweek of production or nonsupervisory workers, manufacturing (hours): U.S. Department of Labor, Bureau of Labor Statistics. This series is the total of paid labor-hours of manufacturing production workers divided by the number of such workers during the payroll period that includes the 12th of each month. Figures include full-time, overtime, and part-time work, also time paid for holidays, vacations, and sick leave. Cyclical changes in this series usually have led those of the employment and inverted unemployment rate series, because employers evidently adjust the workweek of their labor force more readily to temporary changes in labor requirements than they change the size of the labor force itself.

Average weekly initial claims for unemployment insurance, state programs: U.S. Department of Labor, Employment and Training Administration; seasonal adjustment by Bureau of Economic Analysis. This series measures the average number of persons who file first-time claims for unemployment compensation each week in a given month. Cyclical changes in it are inversely related to general business fluctuations; therefore, the data are inverted for cyclical analysis.

Percent change from 3 months earlier in consumer credit outstanding: Board of Governors of the Federal Reserve System. This series is the percent change in the amount of consumer credit outstanding during the month from that outstanding 3 months earlier. Consumer credit includes automobile debt, credit card and department store card debt, educational loans, mobile home loans, boat loans, trailer loans, and vacation loans. The loans may be secured or unsecured. Home mortgages and home equity loans are not included in such debt.

Primary Roughly Coincident Indicators

Number of employees on nonagricultural payrolls: U.S. Department of Labor, Bureau of Labor Statistics, establishment survey. This series is a comprehensive measure of the number of persons on the payrolls of establishments other than agricultural establishments. The industries included in the data are mining; construction; trade; manufacturing; general government; finance, insurance, and real estate; electric, gas, and sanitary services; other services; communication; and transportation.

Index of industrial production (1992=100): Board of Governors of the Federal Reserve System (Series G.17). This series is the most comprehen-

sive measure of the physical volume of goods produced by the manufacturing, mining, and electric utility sectors of the economy. It does not cover production on farms, in the construction industry, in transportation, or in various trade and service industries. The index does not include production at Government-owned-and-operated plants and shipyards.

Personal income, manufacturing industries, 1982-84 dollars: U.S. Department of Commerce, Bureau of Economic Analysis, and U.S. Department of Labor, Bureau of Labor Statistics. The Consumer Price Index (1982-84=100) is used by AIER to adjust current-dollar personal income originating in manufacturing commodity-producing industries to remove the effect of decreases in purchasing power of currency. As just one component of wage and sale disbursements, this series does not include income arising from distributive industries, government, and the service sector, oftentimes sources of noncyclical fluctuation. The cyclical variations in manufacturing income alone are more readily discernible than those in total income.

Manufacturing and trade sales, 1996 dollars: Department of Commerce, Bureau of Economic Analysis and Bureau of the Census. This series is the aggregate value of current-dollar sales by the manufacturing, wholesale, and retail trade sectors of the economy. Deflating is done by the source.

Ratio, number of employees in nonagricultural industries to the working age population: U.S. Department of Labor, Bureau of Labor Statistics, household survey. The numerator is a component of total civilian employment, in particular it is the number of persons 16 years of age or older who are employed in activities other than agriculture. The denominator is the total noninstitutional population 16 years of age or more.

Gross Domestic Product, 1996 dollars: U.S. Department of Commerce, Bureau of Economic Analysis. GDP purportedly measures the market value of all final goods and services produced within the Nation's borders. It is deflated by the source agency with appropriate price indexes (on a 1996 base) in order to get an estimate of the volume of output.

Primary Lagging Indicators

Average duration of unemployment (weeks): U.S. Department of Labor, Bureau of Labor Statistics, household survey. This series reflects the average length of time, in weeks, that unemployed persons have been looking for work or, for persons who have been laid off, the time since the termination of their most recent employment. Cyclical changes in this series are inversely related to general business fluctuations; therefore, the series is inverted in business-cycle analysis.

Manufacturing and trade inventories, 1996 dollars: U.S. Department of

Commerce, Bureau of Economic Analysis and Bureau of the Census. This series is the aggregate dollar book value of inventories of materials, goods in process, and finished goods stocked by the manufacturing, wholesale, and retail sectors of the economy. Deflating is done by the source.

Commercial and industrial loans outstanding, 1992 dollars: U.S. Department of Commerce, Bureau of Economic Analysis; Board of Governors of the Federal Reserve System; and the Federal Reserve Bank of New York. The base series measures the average dollar amount of business loans outstanding each month for all commercial and industrial purposes except real estate. Data are based on reports to the Federal Reserve by more than 300 large commercial banks. Deflating is done by the source.

Ratio, consumer debt to personal income: U.S. Department of Commerce, Bureau of Economic Analysis and the Board of Governors of the Federal Reserve System. Consumer debt reflects all short- and intermediate-term credit used to finance the purchase of commodities and services for personal consumption or to refinance debts originally incurred for such purposes. Revolving credit also is a component of consumer credit. Loans extended to businesses or for business purposes are excluded. Personal income is the aggregate current-dollar value of incomes received by individuals, unincorporated businesses, and nonprofit institutions. It includes interest income and transfer payments and income imputed (estimated) for the use of owner-occupied homes, for consumption of farm goods, and for unpaid services. The ratio of consumer debt outstanding to personal income is an indication of the willingness, and oftentimes the ability, of consumers to incur debt in relation to their income.

Percent change from a year earlier in the index of labor cost per unit of output, total manufacturing (1992=100): U.S. Department of Commerce, Bureau of Economic Analysis; Board of Governors of the Federal Reserve System. This series measures the relationship between the volume of production of manufactured goods and the cost of the labor involved in that production. It is the percent change in the ratio of the index of compensation of employees in manufacturing to the manufacturing component of the index of industrial production, for 1 month from the ratio 12 months earlier. Compensation of employees includes both wages and salaries and employer supplements. The industrial production index is described under "Primary Roughly Coincident Indicators."

Composite of short-term interest rates: Federal Reserve Bank of St. Louis. This composite is the monthly average of the prime 30-day commercial paper rate and the 3-month Treasury bill rate in the secondary market.

V.
GLOSSARY OF TERMS

MANY terms are used in connection with the statistical indicators of business-cycle changes. A number of them may be unfamiliar to some readers. In order to facilitate an understanding of the statistical indicators, we describe these terms below.

BEA: Bureau of Economic Analysis, a large statistical unit within the U.S. Department of Commerce. When appearing thusly, NBER-BEA, reference is to the joint efforts of the National Bureau of Economic Research (see below) and the Bureau of Economic Analysis.

Business cycles: Business cycles are recurrent phases of expansion and contraction of general business activity. Historical data indicate that in any economic system that relies on the profit motive, business activity does not occur at a constant rate but rather moves in cycles of prosperity, crisis, recession, revival from recession, and finally prosperity again. These four phases can be consolidated into two phases—expansion and contraction. Expansion refers to upward trends of activity; contraction to downward trends. There are no beginning or ending points, only continuous cycles. Although business cycles are recurrent, both the duration and magnitude of individual cycles vary greatly. (See also the description of "cyclical" in this glossary.)

Composite index: A summary measure designed to indicate changes in the direction of aggregate economic activity. Each index measures the average behavior of a group of economic time series that demonstrate similar timing at business-cycle turns but differ widely in terms of the sectors of the economy represented. The most important criteria used by The Conference Board (see below) to select and group the components of the indexes is cyclical timing. Each month The Conference Board publishes composite indexes of leading, coincident, and lagging indicators. In 1996 the Conference Board took over responsibility for the composite indexes from the BEA. (See also "diffusion index.")

(The) Conference Board: A not-for-profit, non-advocacy fact-finding institute that publishes its research on economic trends and management practices, and makes it available at low cost or no cost to the public. In 1996, the Conference Board assumed responsibility to produce and disseminate the monthly cyclical indicators, including the leading economic indicators and the composite leading index, from the BEA (see above). Prior to 1970, the Conference Board was the National Industrial Conference Board.

Consensus forecasts: Predictions of future economic aggregates made by applying a measure of central tendency (average, median, etc.) to the forecasts of individuals or groups of economists. In the recent past, the consensus forecast has been more accurate than the individuals' forecasts that comprise it.

Constant dollars: Several of the primary indicators are reported in constant dollars. Because of rapidly increasing prices during some recent years, cyclical movements of activities reported in current dollars (dollars reflecting current purchasing power) were obscured. The distorting effect of increasing prices (decreasing purchasing power of dollars) can be substantially reduced by dividing current-dollar figures by an appropriate price index. This results in figures reflecting dollars with more nearly constant purchasing power; hence the term "constant dollars" (sometimes also called "real" dollars inasmuch as constant-dollar amounts reflect the actual, or "real" purchasing power of the dollar in relation to its prior purchasing power).

Current dollars: Series reported in current dollars are those reported in dollars reflecting current purchasing power. No adjustment for depreciation of the currency is made.

Cyclical: A term used to distinguish between different types of changes in general business activity or in particular economic time series. Cyclical trends differ from temporary fluctuations in that the former usually are of many months duration, whereas temporary fluctuations usually are of only one or a few months duration. The two cyclical statuses are expanding and contracting. Cyclical turns are changes from one status to the other. (See also "business cycles.")

Deflated series: A deflated series is one that is reported in dollars adjusted for reduced purchasing power associated with generally rising prices. (See also "constant dollars.")

Diffusion index: A diffusion index is a single series reflecting the number of series comprising a group that increased during a particular month as a percentage of the total number of series comprising the group. Series in such groups have a common base, such as employment measures, price indexes, or leading indicators. A diffusion index reveals the behavior of the overall group. (See also "composite index.")

Economic forecast: An assertion made about probable future economic events or levels of certain types of economic activities. Forecasting is a process of systematically identifying and assessing the status of key economic aspects that are useful for predicting some future economic events.

Economic time series: An economic time series consists of a quantitative

measure of some aspects of economic activity collected and recorded during a period of time. All statistical indicators of business-cycle changes are economic time series. Throughout this booklet and in our *Research Reports* we refer to them simply as "series."

False signal: An economic time series gives a false signal when, during an expansionary phase (contractionary phase), the series decreases (increases) and that decrease (increase) is not associated with a cyclical reversal to contracting (expanding). For example, if the M1 money supply trended upward for 6 months, decreased for 2 months, and then resumed the upward trend, the 2-month decrease would have been a false signal of contraction.

Growth cycle: A growth cycle is a fluctuation in general business activity consisting of a period of rapid increase in business activity followed by a period of substantially lower increase or even brief decrease. Growth cycles differ from business cycles (expansion-contraction) in that general business activity does not necessarily contract in a growth cycle and if it does contract, the contraction is brief. Several growth cycles have been identified since 1947 (1951-52, 1962-64, 1966-67, 1984-86, and 1995). Because growth cycles are more difficult to identify than business cycles, they are not as well defined and measured as business cycles.

Indeterminate status: If the cyclical status of a statistical indicator is not clear from available data, we show its status as indeterminate — the absence of a discernible trend at the moment. The status of a series may be indeterminate if the proportions tables indicate a nearly equal chance of expansion or contraction, or if fluctuations in the series for several months reveal no identifiable trend.

Inverted series: Inverted series are those series for which an increase in the data reflects a deterioration in that aspect of business activity. For example, increases in the unemployment rate reflect a deterioration in employment conditions. Inverted series are charted with higher values toward the bottom of the chart. Thus, for an inverted series, upward trends in the plotted data reveal improvement; downward, deterioration. This is done so that all series can be analyzed easily upon inspection.

Lag: This term refers to the timing of a cyclical turn in a specific series in relation to the corresponding cyclical turn in business activity. A specific series that "lags" is one that usually turns *after* a turn in general business activity. Lagging indicators are those series usually involved in such a sequence.

Lead: This term refers to the timing of a cyclical turn in a specific series in relation to the corresponding cyclical turn in business activity. A specific series that "leads" is one that usually turns *before* a turn in general business

activity. Leading indicators are those series usually involved in this sequence.

MCD (months for cyclical dominance): MCD is a statistical estimate of the number of months required for cyclical movements in an economic time series to dominate irregular fluctuations. The MCDs for series differ according to the relative smoothness of the series. The smoothest series have an MCD of 1, while the most erratic series we use, the change in sensitive materials prices, has an MCD of 6. In deriving the MCD, the average monthly changes in the series (without regard to sign) are computed, and both an average cyclical component and an average irregular component are estimated statistically. The MCD is the shortest span in months for which the average cyclical change is greater than the average irregular change.

Moving average: A method used for smoothing erratic series so that cyclical movements may be more clearly identified. The length of the moving average is determined by the MCD for the series. (see MCD above) A 3-month moving average is the arithmetic average of the data for the 3 most recent months. That figure usually is plotted at the center month. A 3-month average for January, February, and March would be plotted at the middle month — February. When April data became available, February, March, and April data would be averaged (January is dropped) and plotted at March; thus the series would be a 3-month *moving* average of the base series. Occasionally, moving averages are plotted at the terminal month (and noted as such), but centered moving averages are more appropriate and meaningful in most circumstances.

NABE: The National Association for Business Economics was founded in 1959 and has grown into an association of thousands of members who have a common interest in measuring and interpreting data related to business conditions and analyzing the underlying influences affecting the course of economic activity.

NBER: The National Bureau of Economic Research was founded in the early 1920s to undertake and disseminate unbiased research based on scientific methods. This private, nonprofit nonpartisan institution is widely recognized as having done the most extensive "laboratory" work in the area of statistical indicators of business-cycle changes. When appearing as ASA-NBER, reference is to the joint forecasting efforts of the American Statistical Association and the National Bureau of Economic Research.

Peak: Peak or peak month without further modifiers refers to the month during which a specific series or general business activity reached its highest level from which it subsequently decreased. A cyclical peak is not necessarily a record high level. The series may have reached a record peak during

some other cycle.

Reference cycles: Reference cycles are the recurrent cycles of general business activity. Dates of reference peaks and troughs have been designated by the NBER. That organization occasionally revises reference-cycle peak and trough months. (See also "business cycles" in this glossary.)

SAAR: Seasonally adjusted annual rate. Movements of the data from one month or one quarter to the next are often expressed as annual rates—that is, the data reflect what the percentage change would be if the current rate were maintained for a twelve-month period.

Seasonally adjusted: Fluctuations in many series recur during some months of each year for reasons other than cyclical movements. For example, retail sales usually are greater during November and December because of holiday buying. Such seasonal fluctuations obscure cyclical movements and thus are removed by a statistical technique. Series for which this has been done are said to be seasonally adjusted.

Series: See "economic time series."

Specific cycles: Specific cycles are the recurrent cycles of individual series. Their peak and trough months do not necessarily correspond to those of the reference cycles. Specific peaks and troughs are peaks and troughs in the specific series. (See also "reference cycles.")

Statistical indicators: Statistical indicators of business-cycle changes are those economic time series selected by AIER that historically seem most useful for assessing the trend of and the cyclical turns in general business activity. The series selected reflect many aspects of business activity, and they are grouped according to their timing in relation to the business cycle (leading, roughly coincident, and lagging). We use 24 primary statistical indicator series: twelve primary leading indicators, six primary coincident indicators, and six primary lagging indicators

Trough: Trough month refers to the month during which a series, or general business activity, reached its lowest recent level from which it subsequently increased. The most recent trough is not necessarily a record low level. The series may have reached a record trough during some other cycle.