Forecasting Business Trends

By
The Editorial Staff

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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

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* 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 business people 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.

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 business managers to have accurate knowledge of such things as future price levels for raw and component materials, the future level of consumer demand for their goods, and future wage rates for their employees, their ability to make profitable business decisions would be greatly enhanced. Lacking a crystal ball, however, they must rely upon predictions of future economic conditions in those areas most affecting their 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 have been 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 economic 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 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 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, Nobel-prize winner 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 statistical 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, 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 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 historical 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 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 provides 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. One example is the "Survey of Professional Forecasters," the oldest quarterly survey of economic forecasts in the United States. The survey began in 1968 and was originally conducted by the American Statistical Association and the National Bureau of Economic Research (NBER). The Federal Reserve Bank of Philadelphia took it over in 1990.

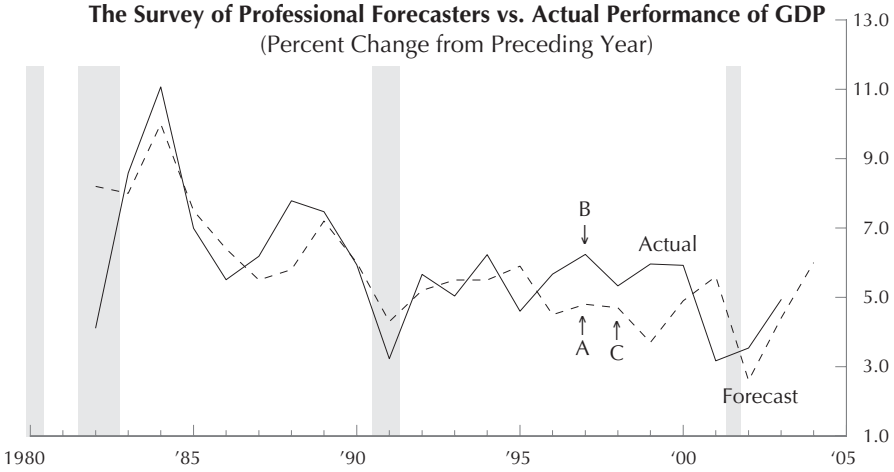
The survey compiles the predictions of professional economic forecasters regarding the growth rates of over a dozen economic measures, including output, price inflation, and employment. Chart 1 shows the survey's average forecast for the most widely followed economic series, Gross Domestic Product (GDP). The data show the predicted year-to-year percent change in nominal GDP, as well as the actual change, for each year

from 1982 to the present. The forecasts were made one quarter before each year began.

The data clearly show a substantial divergence between the forecasts and actual events. For example, in 1982, the actual growth rate of output was half of what the forecasters predicted. On the other hand, from 1996 to 2000, actual GDP growth was consistently greater than that forecasted. In the mid-1990s, the forecasters predicted that the rate of growth would slow; actually, it accelerated. In 2001, the opposite occurred: the forecasters said that GDP growth would surge, but in reality it plummeted.

Even allowing for these errors, the records of forecasters may appear more impressive than they actually are because of the way they are portrayed in this kind of chart. We illustrate by reference to the GDP curve. Point A was the forecast for the percentage change in GDP in 1997. This forecast was made in the fourth quarter of 1996. Point B was the actual percent change in GDP in 1997. Before the forecast of 1998 growth in GDP (Point C) was made in late 1997, forecasters had actual GDP data for three quarters of 1997. So they would not be forecasting Point C from their 1997 forecasted value (Point A) but rather more nearly from the actual 1997 growth rate (Point B). In this sense, the "linear" depictions of 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.

Chart 1
Prediction and Performance:
The Survey of Professional Forecasters vs. Actual Performance of GDP
(Percent Change from Preceding Year)



Note: Prior to 1993, data are for GNP. Source: Federal Reserve Bank of Philadelphia and Bureaus of Economic Analysis.

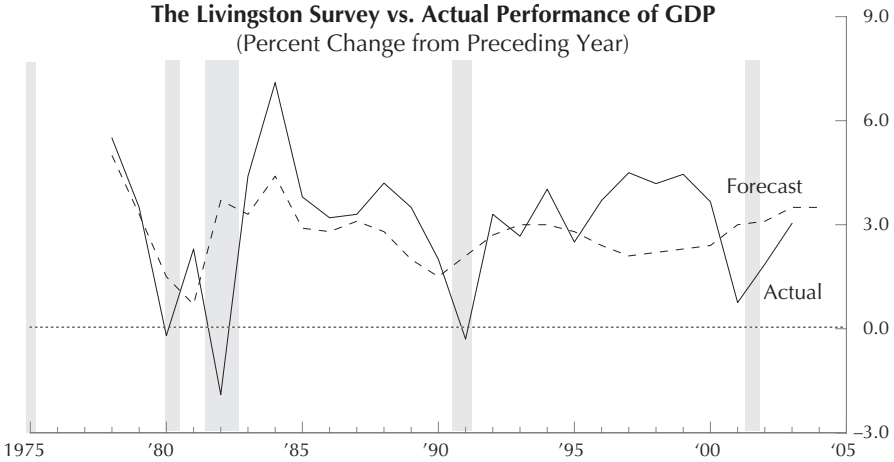
A change in the trend of general business activity from cyclical expansion to contraction is more difficult to forecast accurately than a continuation of trends. The accuracy of the forecasts depicted in Chart 1 is greatest during the long periods of expansion in the 1980s and 1990s. It is poorest during the recessions of 1980-82, 1990-91, and 2001. 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 oldest continuous survey of economic forecasts, it was started in 1946 by Joseph Livingston, a columnist for the Philadelphia Inquirer, and taken over after his death in 1992 by the Federal Reserve Bank of Philadelphia. Chart 2 reveals the accuracy (or inaccuracy) of the survey's average forecasts of annual GDP growth rates. As can be seen, these forecasts, which were made in June of the preceding year, failed to predict the recessions of 1981-82 and 1990-1991 (i.e., when the percent change in GDP became negative). They also consistently underestimated GDP growth from 1996-2000 and missed the sharp drop in growth in 2001 (i.e., the 2001 recession). In short, the forecasters included in the Livingston Survey missed the turning points of the business cycle—when accurate forecasts are most critical (and hardest to achieve).

As further evidence of the inadequacy of economic forecasts, consider what the Congressional Budget Office (CBO) says about them. The economists at this government agency are responsible for making economic

Chart 2

Prediction and Performance:
The Livingston Survey vs. Actual Performance of GDP
(Percent Change from Preceding Year)



Note: Prior to 1993, data are for GNP. Source: Federal Reserve Bank of Philadelphia and Bureaus of Economic Analysis.

forecasts and Federal budget projections, and even they admit that the track record of forecasters leaves much to be desired. In the most recent review of their record, they concluded:

> … forecasters collectively tend to err during periods that include either turning points in the business cycle or significant shifts in the trend rate of productivity growth. For example, most forecasters overestimated the economy's growth rate and underestimated inflation in forecasts they made just before and during the back-to-back recessions of the early 1980s. This pattern was repeated, albeit to a lesser degree, in the forecasts they made just before the more moderate recession of the early 1990s.
>
> …because forecasters underestimated the trend rate of productivity growth beginning in 1996, they under predicted the economy's growth rate and overpredicted inflation.
>
> …great uncertainty about the trend rate of productivity growth remains. That uncertainty will continue to cause forecasting errors, particularly for projections made five years ahead.

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 five, ten, 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. Investors and Govern-

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)
Mar. 2001	May 2001	(+2)	Nov. 2001	Mar. 2002	(+4)

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

ment policymakers also might put such forecasts to good use.

Table 1 lists the nine 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 those in 1981 and 2001, we forecast the reversal from zero to seven months before it occurred. That our forecast in 1981 was made three months after a peak occurred was attributable to the closeness with which the 1981 recession followed the 1980 recession. In the 2001 episode, we did see our leading indicators weaken prior to the peak in March 2001, but at that time most of the weakness appeared to be concentrated in the goods-producing sector. We incorrectly held off calling the recession until May when, as it turned out, the recession was already underway.

At each business-cycle trough, our "forecast" that expansion probably would begin was made from one to four months after the trough had occurred, except for the November 1982 trough when we forecast the business upturn seven months before it occurred and the November 1970 trough when we failed to call the turn until some 16 months later.* There are many reasons for this 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 one or two months. Because data for a

* 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.

particular month sometimes are not available until two or three 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. Over the years we have periodically introduced modifications to our method of assessing the statistical indicators. These refinement have improved our ability to predict reversals in cyclical trends, but we still have not found a useful method for predicting magnitudes of probable changes.

II.

THE STATISTICAL INDICATORS

Introduction

STUDENTS of American economic history have discovered 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 through 2004, 32 complete business cycles have been identified (we now are in the expansionary phase of the 33rd). 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 analysis of economic indicators, also called statistical indicators, provides 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 in use 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. If any particular forecasting technique had a consistent track record of accurate prediction, it probably 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 published 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 or downturns in stock prices usually were followed by similar turns in bank debits, which were then followed by turns in interest rates. The sequential relationship of these movements 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. More probably, however, 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 then. However, the researchers analyzing the Harvard curves apparently chose to focus on the one-month or two-month increases in stock prices that occurred now and then rather than on their downward trend. Most of the times that the A curve increased temporarily, the researchers forecast that business activity would soon follow. Use of the Harvard curves subsequently was discontinued.

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 interest rates tend to lag. (The statistical indicators we currently use include similar series: the index of 500 common stock prices is a primary leading indicator of business activity, and a composite of short-term interest rates is 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. A total of 487 series, some of which dated as far back as the 1850s, were

studied. Data for the vast majority of these series, however, were available only for the period following World War I.

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 Morgenthau, 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 one and six months prior to the expansion of general business activity, three series were coincident with such expansion, and four lagged behind the upturn in 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 took over the NBER's task of publishing regular updates on the indicators, and in 1996 the Conference Board, a private research organization, took it over. Of the 21 "original" primary leaders, only four series (or similar series) now are included in the Conference Board's 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 past few years clearly indicate that the business cycle has not been eliminated and that perpetual prosperity is far from assured, contrary to what economists have sometimes suggested. During long periods of expansion, such as the country enjoyed in the 1990s, economists have been known to declare that "the business cycle is dead." But such pronouncements have proven to be as highly exaggerated as the reports of

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* The NBER continues to play a major role in business cycle analysis. Its Business Cycle Dating Committee is entrusted with identifying when recessions officially start and end. For more information, see http://www.nber.com/cycles/main.html.

Mark Twain's death. Recessions have continued to occur. And business people who must make decisions in connection with plans for employment, production, inventories, etc. need some idea of what the near-future trend of business activity will be, in order to minimize faulty and costly policies.

There are several methods in use today for helping one to forecast the near-future trend of business activity. In the absence of more useful methods, "hunches," intuition, or guesswork frequently are relied upon by business people. At the other extreme, highly technical econometric models (employing regression analysis, stochastic procedures, simulations, etc.) are used. Of the methods known to us, analysis of the statistical indicators of business-cycle changes is the most useful and scientific.

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 fashion. 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 changes in the trend of business activity historically were preceded by changes in the trends of some particular 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 an idealized depiction of the characteristic timing of the groups. In reality, the curves are not as smooth, nor the relation between them as exact, as the chart indicates.

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 in advance, future turns in such activity. Sometimes, individual series may fail to forecast a given cyclical change or may falsely signal a change that does not subsequently 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. Just as we look to the leading indicators to show us where the economy is headed, the coincident indicators show us where the economy actually is, and usually provide confirmation of trends previously signaled by the leading indicators.

The lagging series probably are given the least attention by the average business person and by the news media. One might ask why we should analyze series that historically have not turned until after business activity has turned. The reason is that cyclical turns in the lagging series are useful for confirming cyclical turns in business activity. If GDP or any other measure of the recent trend of business activity decreased for, say, half a

Chart 3

Movement of Business-Cycle Indicators

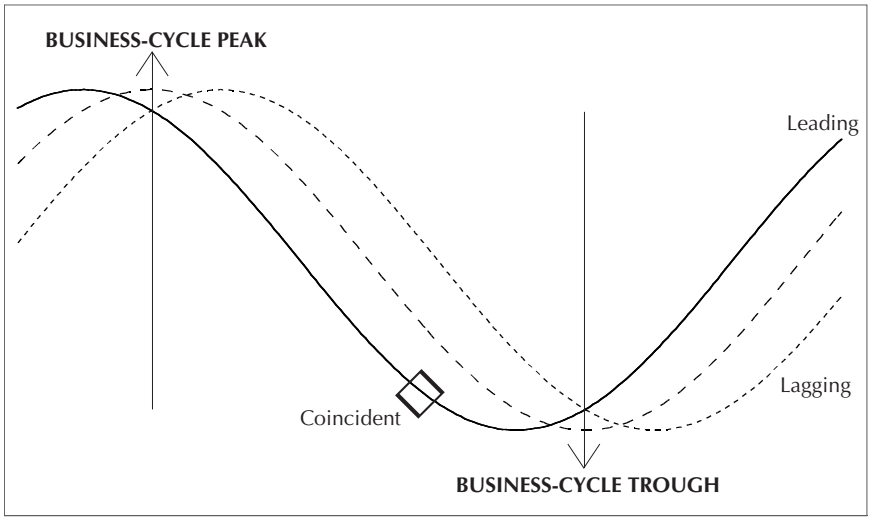


Table 2

Cyclical Expansions and Contractions of Business Activity Since 1854

—— Months of ——		— Number of Months —	
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
	Mar. 2001	120	
Nov. 2001			8
	?	37+*	

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 December 2004.

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.

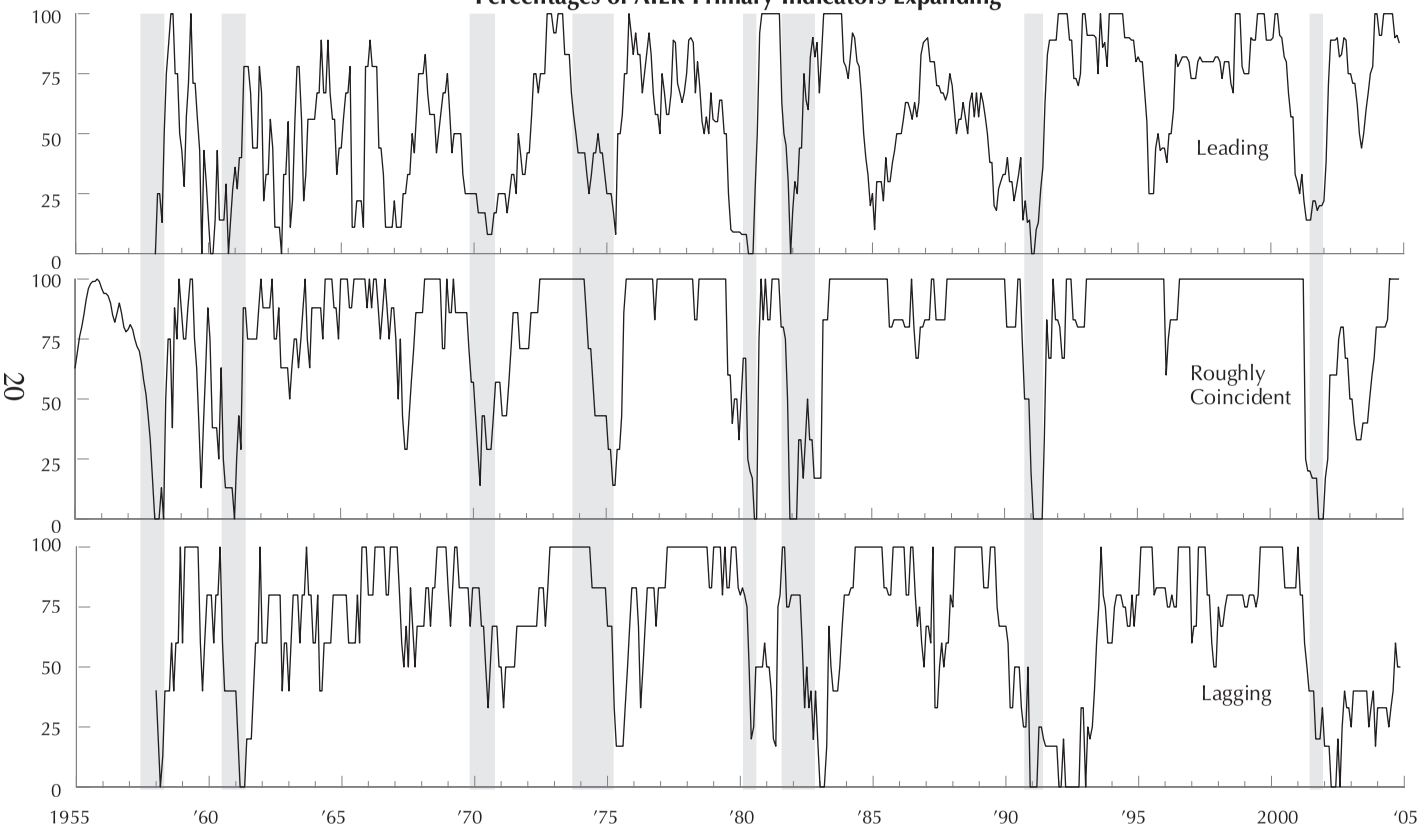
For a series to be a useful indicator, data must be available for a relatively long period of time. This allows us to assess the indicator's track record. If series could be found for which accurate data were available for 200 years, the trends of these series during many different situations could be 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 every business cycle is unique, 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, there have been ten contractions of general business activity, including the one that began in March 2001 and ended in November 2001. These are listed in Table 2, along with the nine 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). All of the postwar contractions have been less severe than the Great Depression (which lasted 43 months) and some earlier recessions. Before World War II, there were 22 contractions in business activity, and they lasted 21 months, on average; the ten since World War II have averaged only ten months in duration. The postwar expansions have also lasted longer, on average, than the prewar ones. Indeed, in the past 20 years there have been only two recessions (in 1990-91 and 2001), and both were mild by historical standards.

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. More generally, the economy is always changing,

Chart 4

Percentages of AIER Primary Indicators Expanding



and the past is not a sure guide to the future. The unique aspects of today's economic situation must be kept in mind in any assessment of the possible future trend of business activity.

One example of how economic changes can affect the statistical indicators is the way that price inflation has distorted them. When the indicators were first developed by the NBER, many of them were denominated in current dollars. (See the glossary for a description of the term "current dollars.") However, when price inflation became a chronic economic problem in the postwar years, the rise in the price level reduce the usefulness of such series, especially in times of high inflation. Whether changes in such series reflected price changes alone, changes in the basic activity, or a combination of the two, was not clear from the base data themselves. To adjust for this distortion, most dollar-denominated series are now reported in constant dollars. (See the glossary for a description of this term.)

The broad array of statistical indicators that was originally developed by the NBER has changed substantially over the years, as it became clear that some series were performing better at peaks and troughs while other were becoming less useful. Different forecasters focus on different subsets of the available data. For example, the Bureau of Economic Analysis used to combine a dozen selected indicators into a single "Leading Economic Index." This index, which is now published by the Conference Board, currently includes ten series, and they are not all the same as the ones used years ago. We use our own selected group of indicators in our regular analysis of the economy, which is published monthly in our *Research Reports*. Some of the series we use are the same as those used by the Conference Board, but some are not (see the box on p. 22 for a comparison). Other forecasters use still other indicators. There is no consensus on which series are the most useful; sometimes it depends on which economic trends are of greatest interest to a forecaster. In general, identifying problems with particular statistical indicators as they develop, discarding less useful ones, and finding reliable replacements, is a challenge for all forecasters.

Earlier we noted that our analysis of the statistical indicators is not infallible and that many difficulties are associated with the interpretation of the indicators. That those difficulties have been sizable in the past is reflected in our "track record" of predictions, 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,

BUSINESS-CYCLE INDICATORS COMPARED

AIER	The Conference Board
Leaders	
1. Yield Curve Index	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. New Private Housing Permits	6. Same
7. Index of 500 Common Stocks Prices (inflation adjusted)	7. Index of 500 Common Stock Prices
8. Manufacturers' New Orders for Core Capital Goods	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. M2 Money Supply
11. Ratio of Manufacturing and Trade Sales to Inventories	
12. Index of Manufacturers' Supply 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 Less Transfer Payments	4. Same
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 the Conference Board are the same but are used to calculate different series (e.g., moving averages).

"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

Many years ago, the NBER analyzed hundreds of economic time series in the search for the ones most useful as statistical indicators of business-cycle conditions. These indicators are now compiled and published by the Conference Board, which currently maintains a database for more than 250 economic series. They cover the most important aspects and sectors of the U.S. economy, including employment, output, production, sales, wages, prices, profits, and interest rates. Each cyclical indicator series is classified as leading, coincident, lagging, or unclassified at reference cycle peaks, troughs, and overall. In addition, the Conference Board constructs composite indexes of leading, coincident, and lagging indicators. The historical records of these composite indexes are plotted in Chart 5.

Until the 1970s, 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 two or three years. However, if a downward trend continues for, say, five months, after an upward trend of twelve 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 the Conference Board (using techniques developed by the NBER and the BEA) considers many factors in analyzing the usefulness of a series as a cyclical indicator. Potential indicators are rated 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 to be 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.

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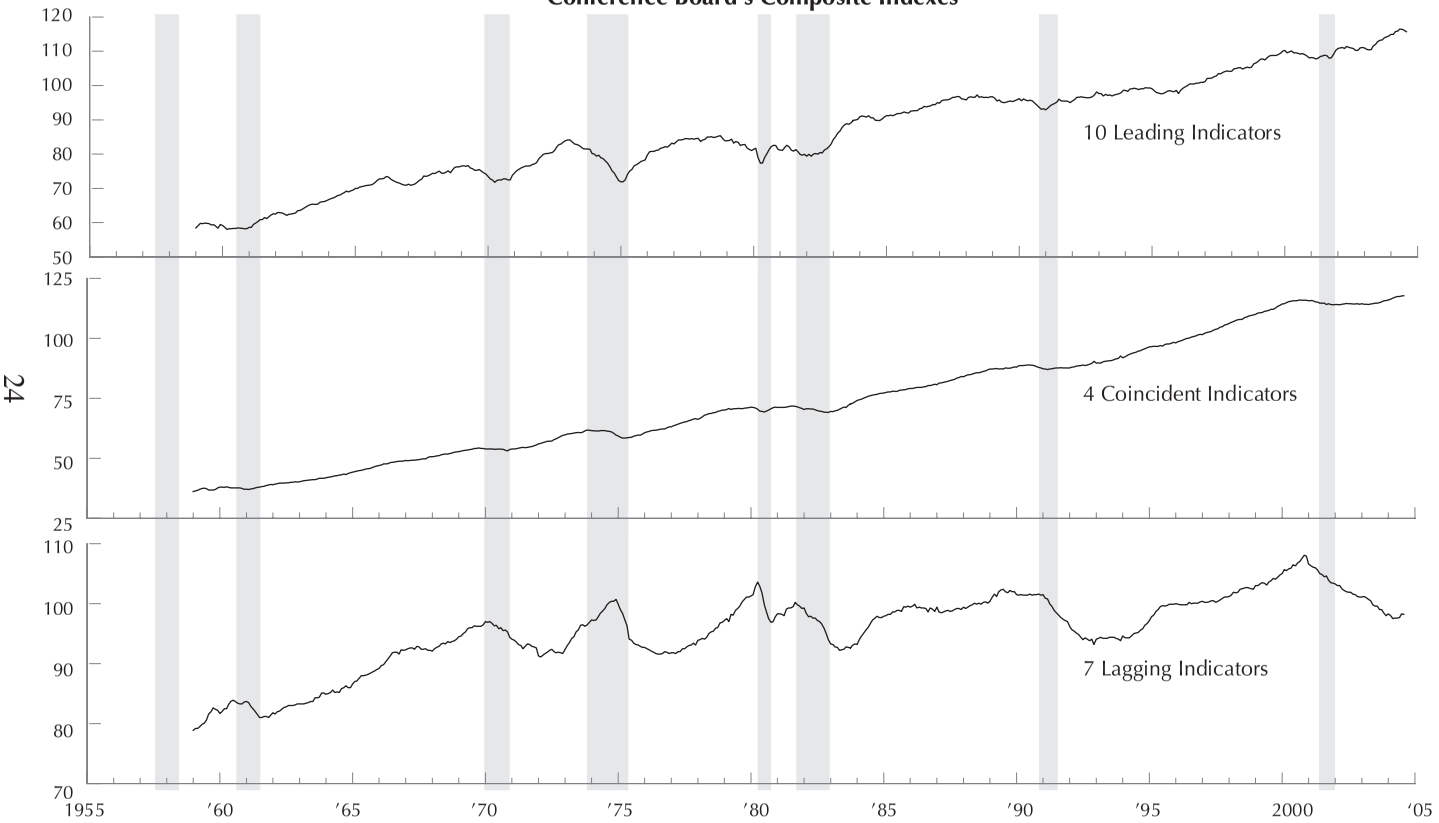
* Victor Zarnowitz and Charlotte Boschan, "Cyclical Indicators: An Evaluation and New Leading Indexes," *Business Conditions Digest,* May 1975, p. xiv.

Chart 5

Conference Board's Composite Indexes



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 years ago by the NBER a primary leading indicator. Data for this quarterly series are not available until two 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 cyclical 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 have been different for each business cycle. For example, a particular series that has been 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 nine months another time, and by only five months at yet another turn. Also, individual series change differently at business-cycle peaks than they do at troughs.

We mentioned that the NBER and the Conference Board have identified numerous statistical indicators of business-cycle conditions that satisfy these criteria, and have assigned each a timing status at peaks, troughs, and overall. It is worth noting that most 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 as a percent-

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* 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.

age of GDP. Similarly, international trade is given relatively little representation among the indicators, even though it, too, accounts for a growing portion of business activity. The primary reason for this focus on goods-producing industries is that, historically, they have been 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.

Some economists have suggested that, because the statistical indicators give little weight to the service sector and foreign trade, they provide an incomplete measure of overall economic activity and may lead to distorted or misleading appraisals of business-cycle conditions. However, in an extensive study some years ago, the Bureau of Economic Analysis 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. It found only one new service sector series, which behaved as a lagging indicator.

From the hundreds of available indicators, we have chosen 24 series—12 leading, six roughly coincident, and six lagging (see the box on p. 22). These 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 such. Brief descriptions of each of these series and of the sources of data for them are provided in Chapter IV.

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 Bureau of Economic Analysis, and now the Conference Board, to select and group the components of their composite 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. The Conference Board publishes these indexes monthly, and the composite index of ten 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 (in order 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 Conference Board's 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. A few of the series in the index are highly volatile, and their movements can dominate the index, producing "false signals" that a recession (or a recovery) is imminent. In addition, some of the series in the Conference Board's composite index are subject to frequent revision, which reduces 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.

For this reason, although we analyze many of the same leading, roughly coincident, and lagging indicators that the Conference Board uses in its composite series, 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 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. The base data for all 24 series are published on the various websites of the reporting agencies and are downloaded as soon as they are available.

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 four 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 one to six months. The smaller the MCD, the more timely (current) is the series. For example, a series with an MCD of five requires a five-month moving average for its cyclical movement to exceed irregular fluctuations. Consequently, the most recent data available reveal cyclical movement at least three months after the fact. (A five-month moving average would be centered on the middle, or third month.) The moving average for a series with an MCD of one, however, is the same as the base data and is late only insofar as the data are reported after the fact.

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 in Charts 6-8 on pages 30-37. The MCD for each primary indicator is shown in parentheses in the charts.

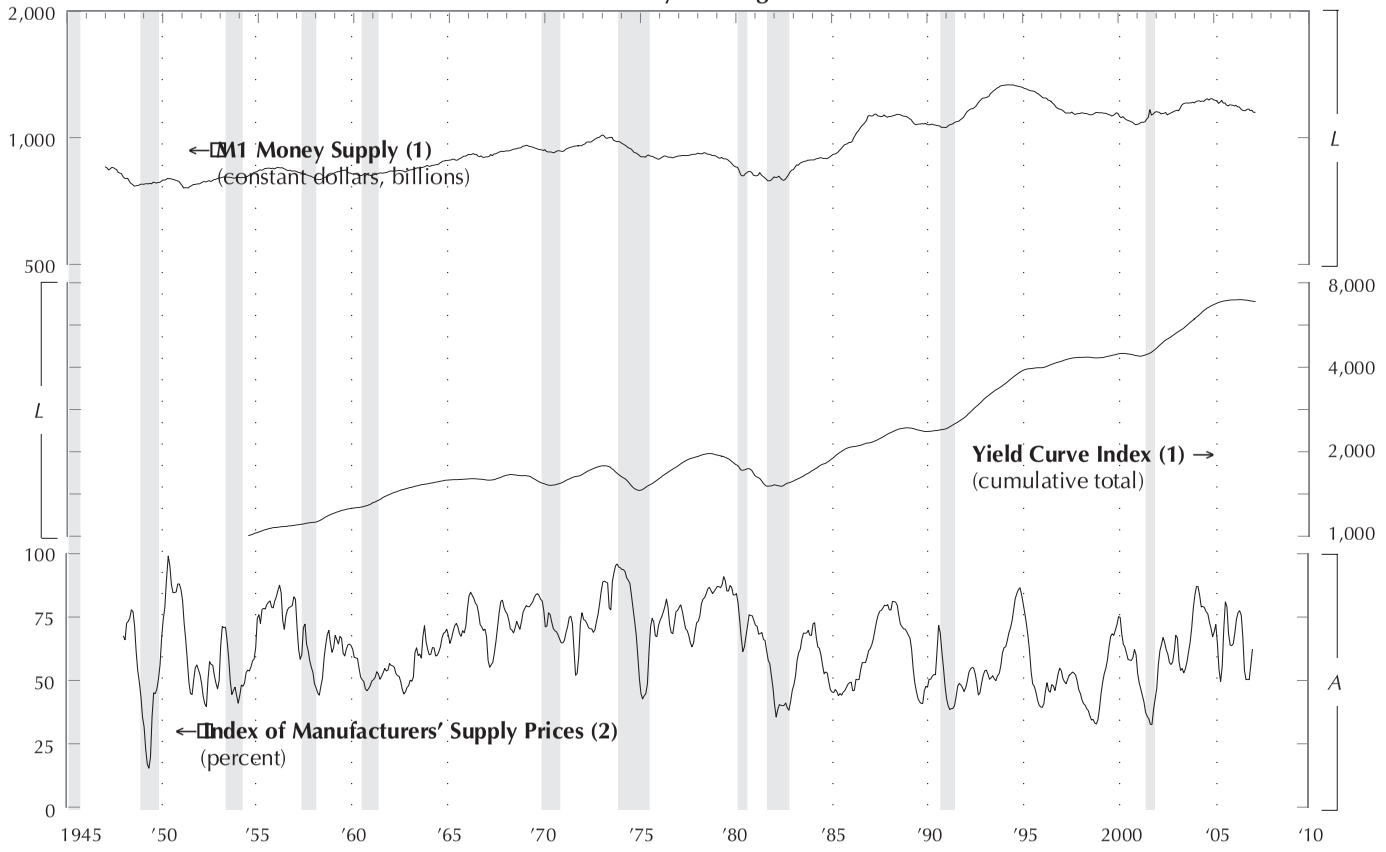
Appraisal of Individual Series

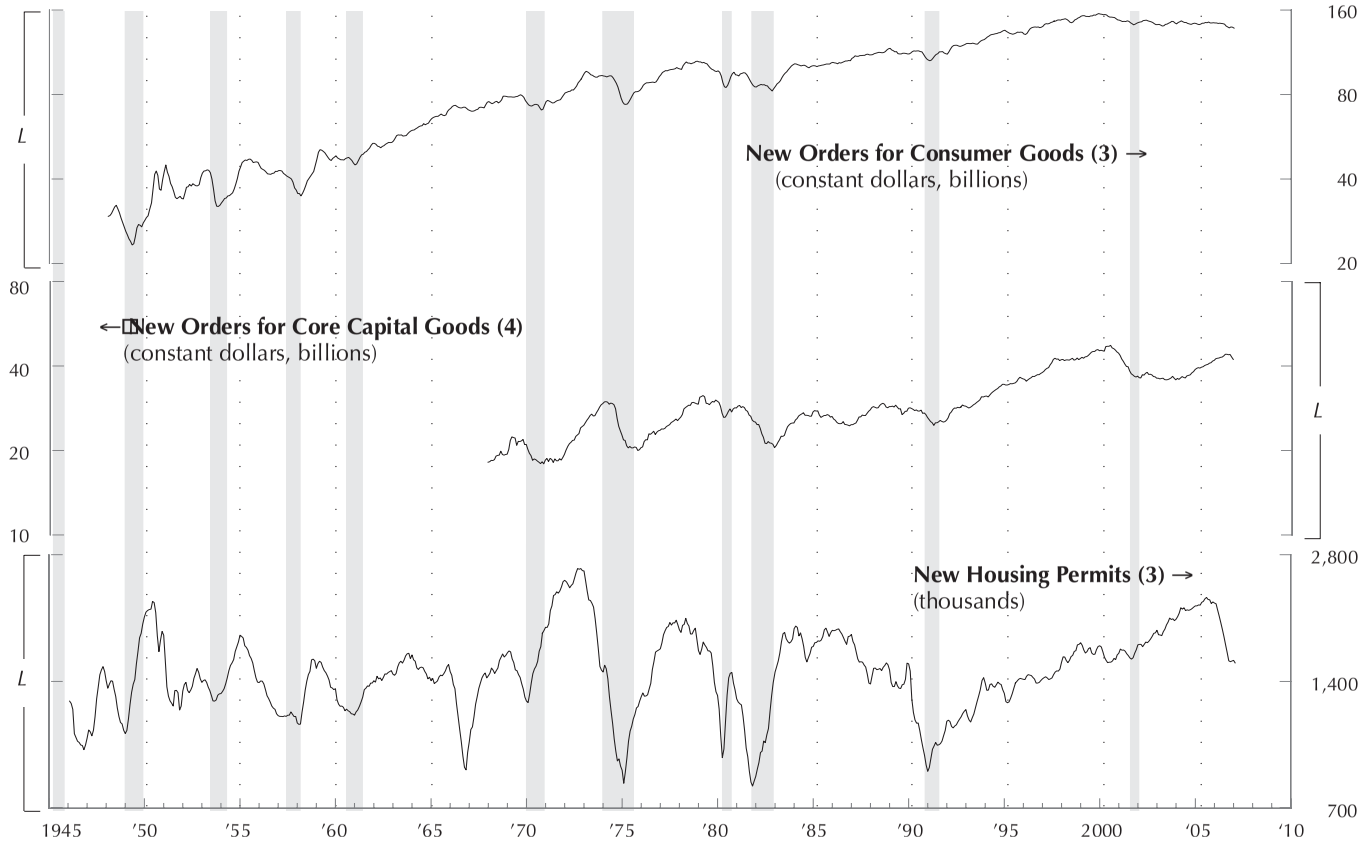
To assess the cyclical status of each series, we compare its most recent changes with past patterns. If a series changes in the direction of an already established cyclical trend, there is no doubt that its cyclical status has remained the same. If, however, a series diverges from an identified cyclical 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 one-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 one, two, three, …ten months. Then we ascertained the proportions of times that decreasing trends of one, two, three, etc. months' duration proved to be associated with an identified cyclical contraction of business activity.

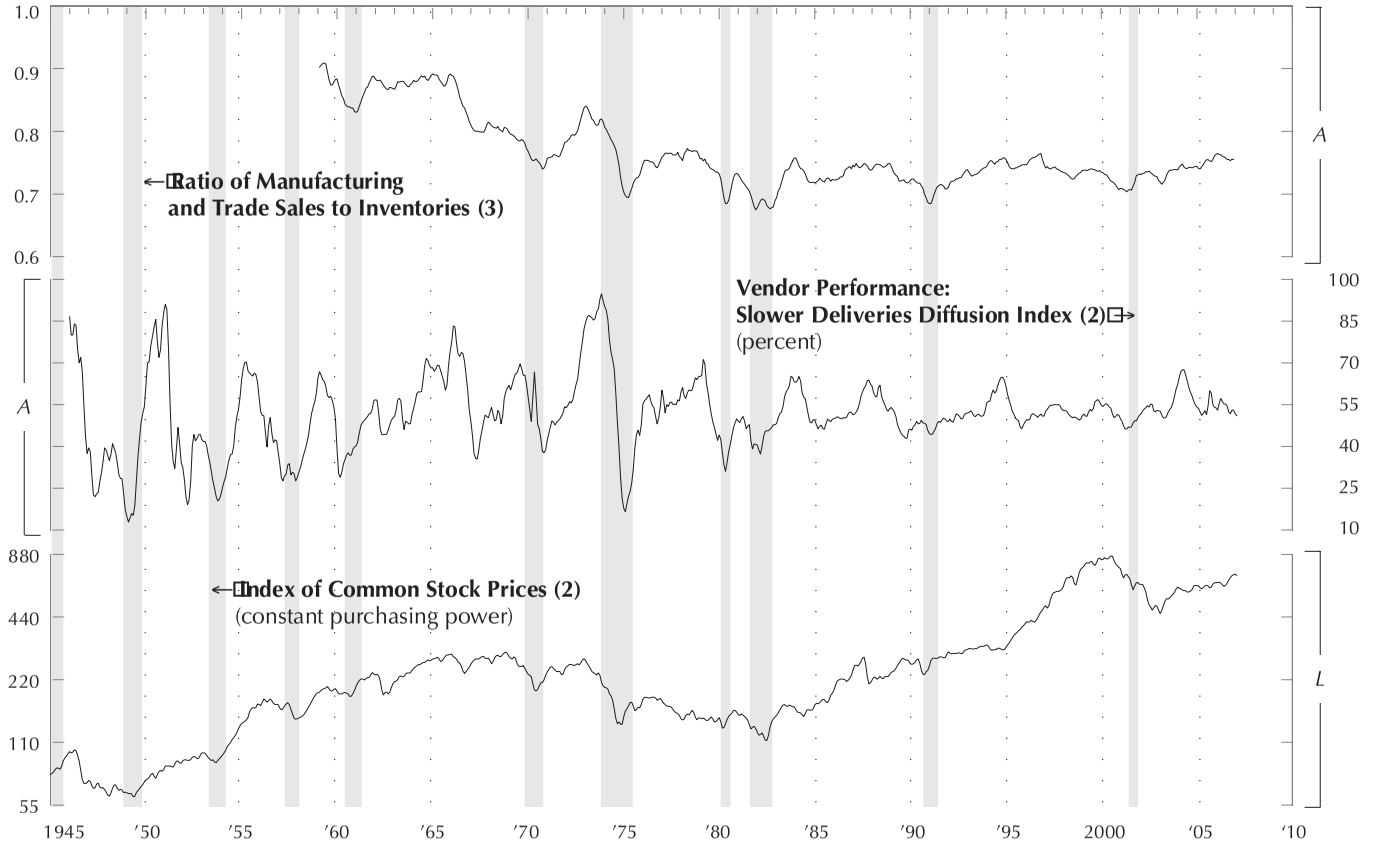
Chart 6: **Primary Leading Indicators**

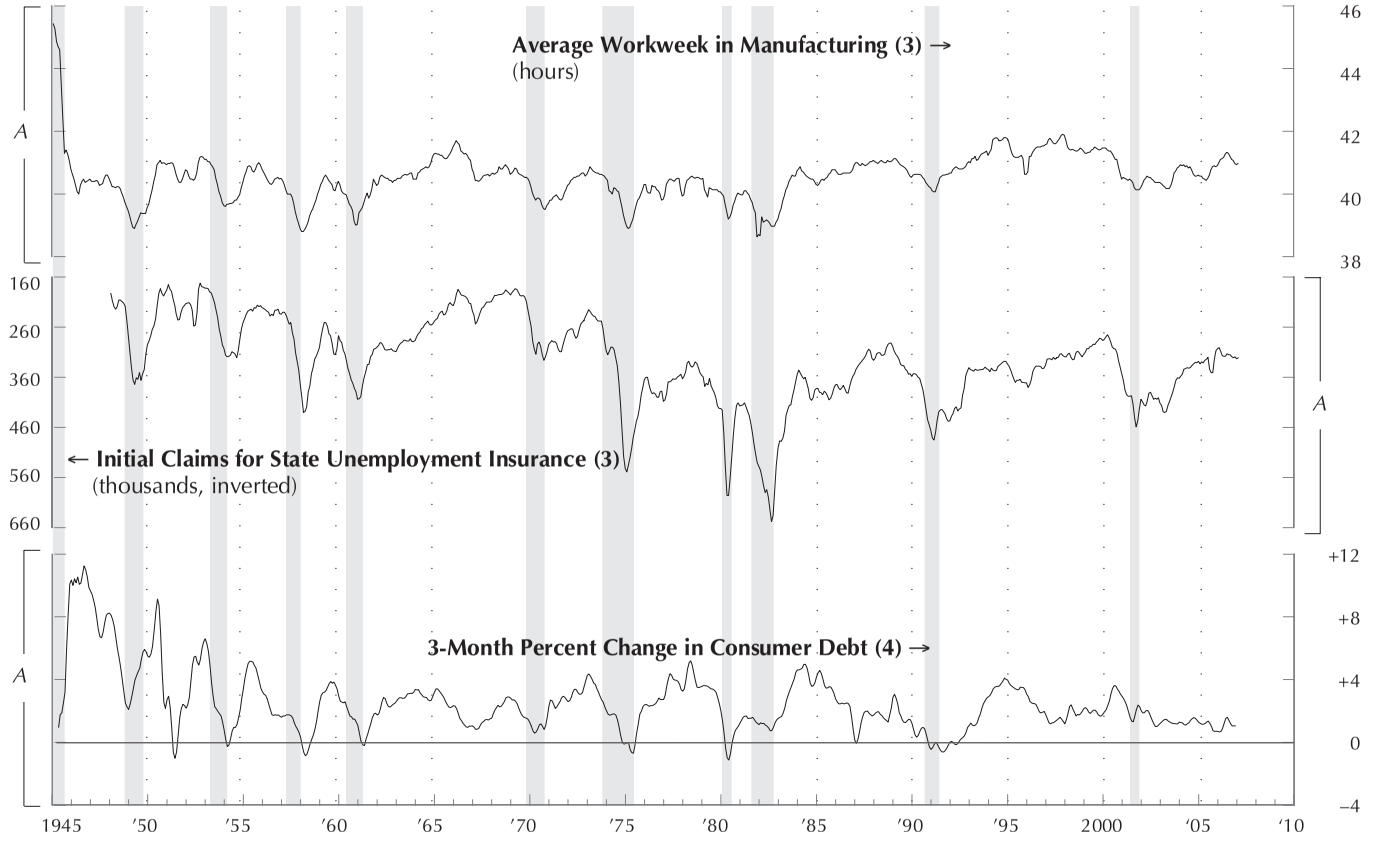




A Arithmetic scale. *L* Logarithmic scale.

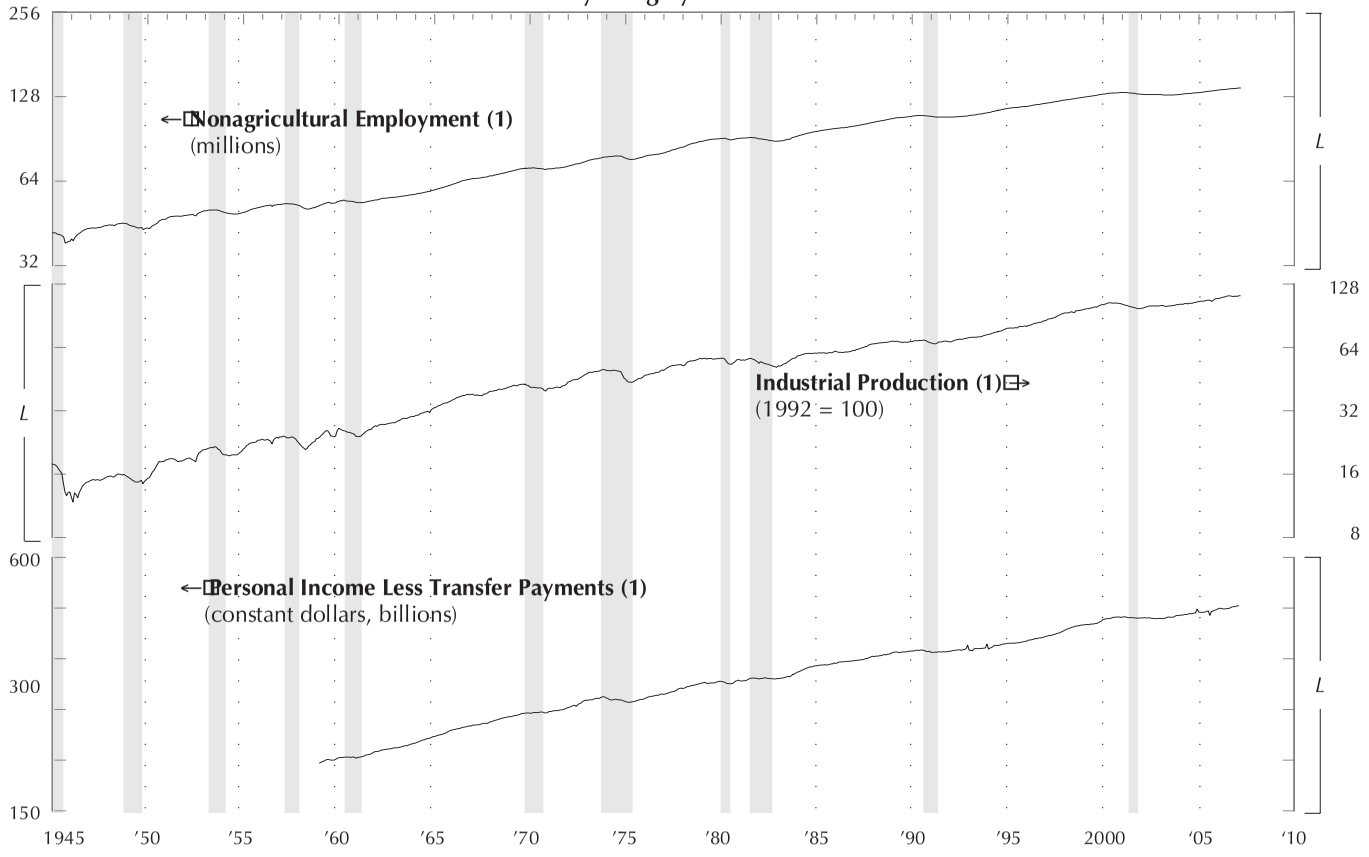
Chart 6: **Primary Leading Indicators** (Continued)

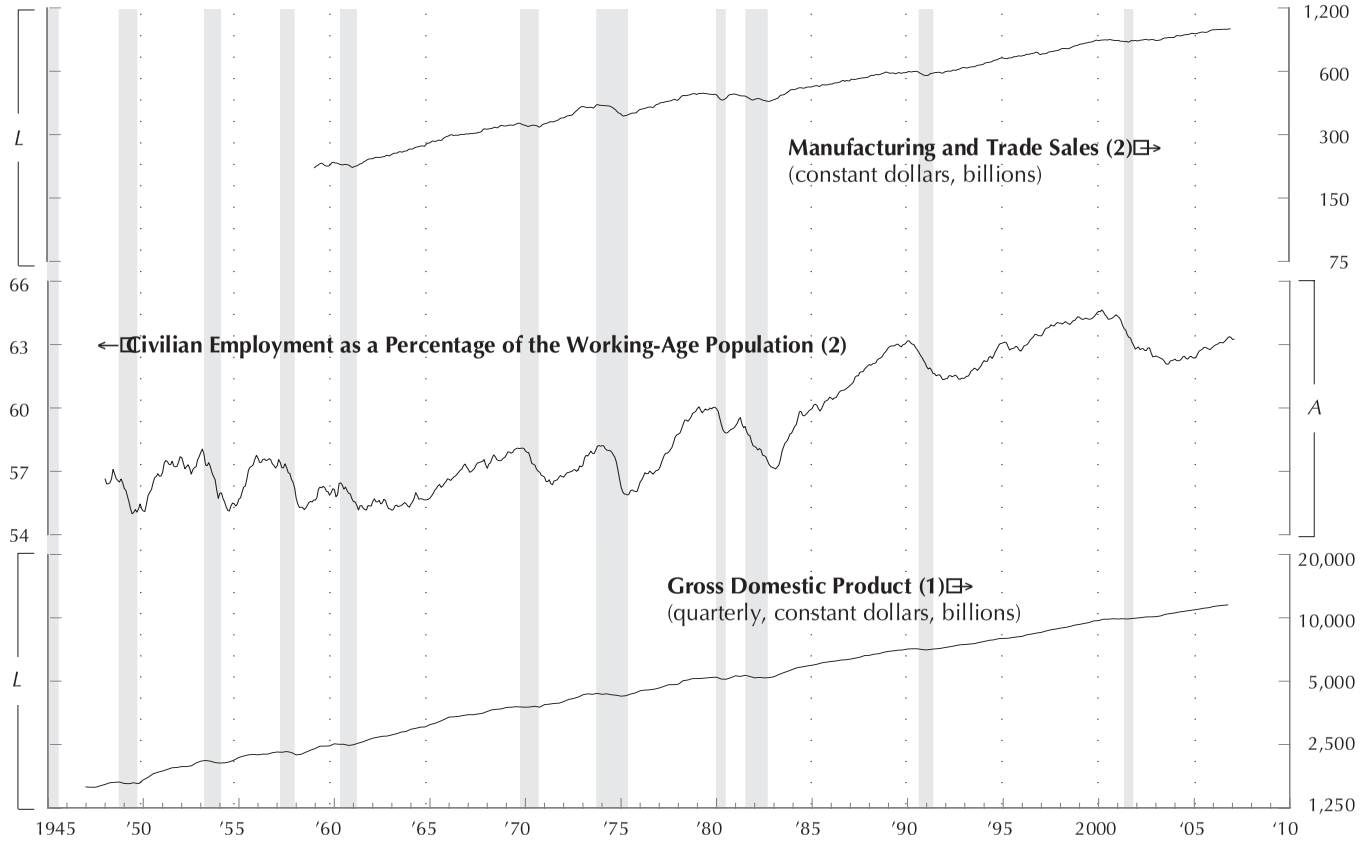




A Arithmetic scale. *L* Logarithmic scale.

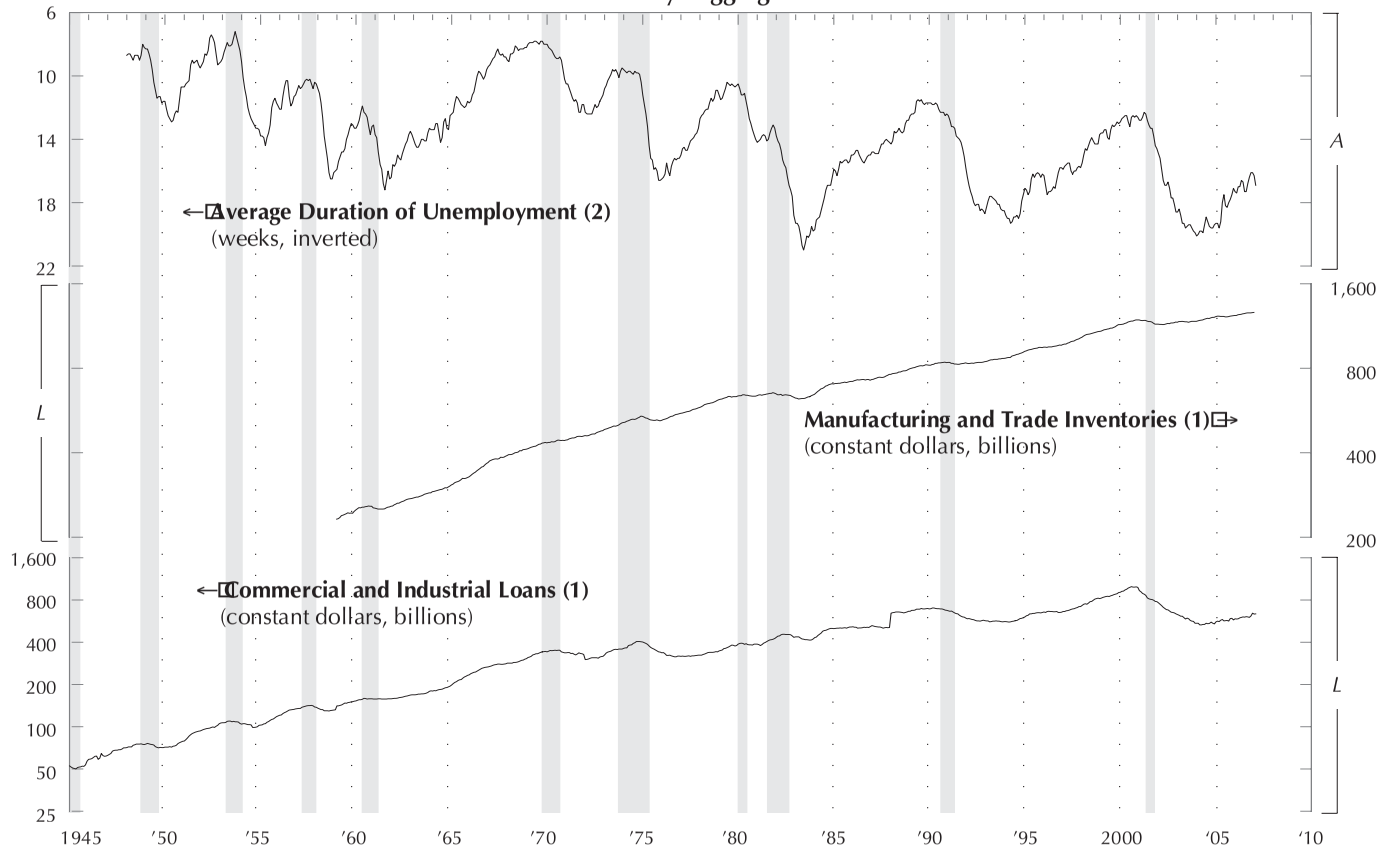
Chart 7: **Primary Roughly Coincident Indicators**

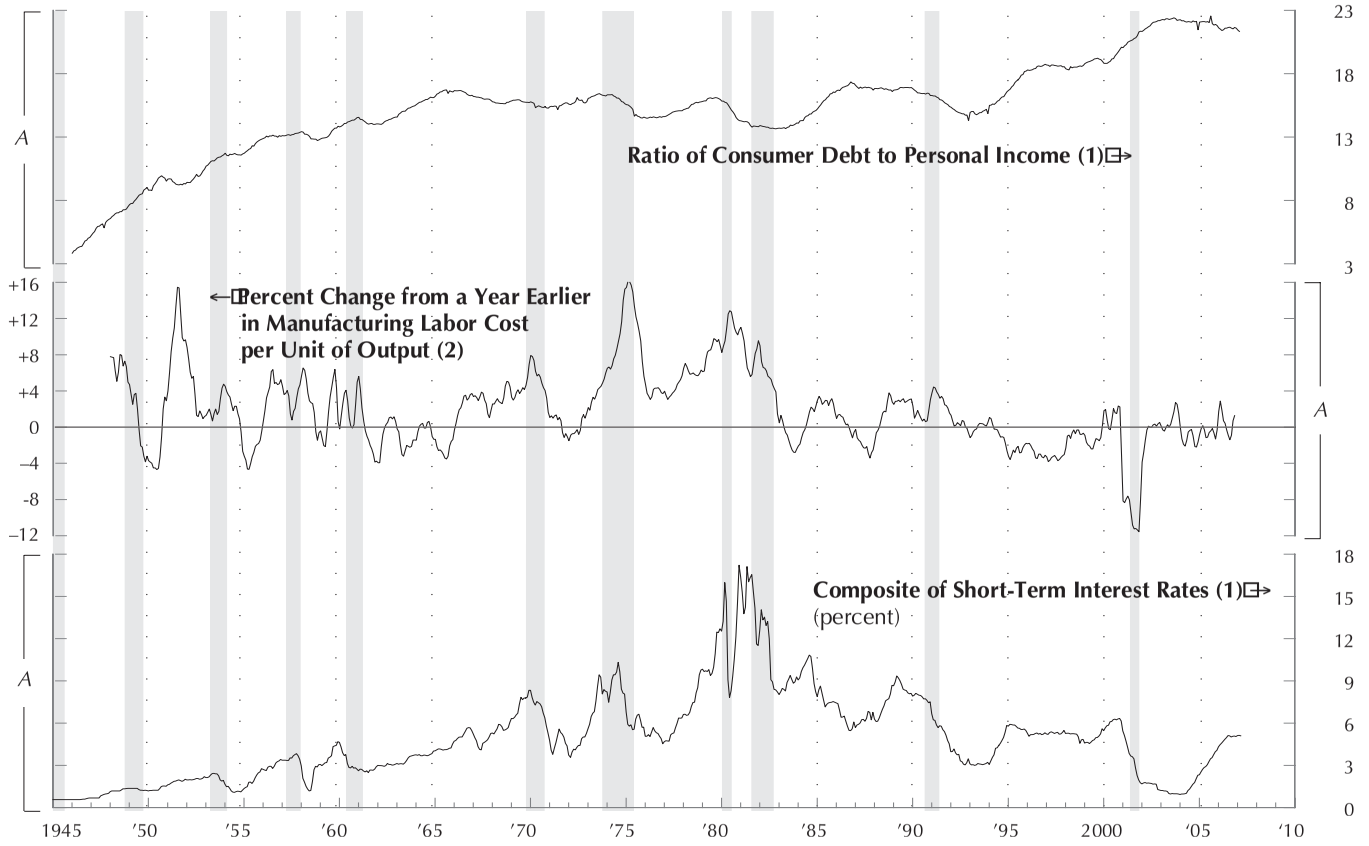




A Arithmetic scale. *L* Logarithmic scale.

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								Increasing Trends During Cyclical Contractions							
	Months of Duration								*Months of Duration*							
Primary Leading	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
M1 Money Supply	0.20	0.32	0.43	0.47	0.60	0.64	0.69	0.69	0.25	0.36	0.43	0.56	0.60	0.75	0.75	0.75
Yield Curve Index	0.67	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.71	0.83	0.83	0.83	1.00	1.00	1.00	1.00
Index of Manufacturers' Supply Prices	0.27	0.31	0.38	0.42	0.48	0.53	0.59	0.59	0.38	0.41	0.47	0.47	0.50	0.56	0.64	0.64
New Orders, Consumer Goods	0.19	0.26	0.30	0.36	0.41	0.53	0.60	0.64	0.35	0.43	0.45	0.50	0.56	0.60	0.60	0.64
New orders, Core Capital Goods	0.19	0.26	0.30	0.36	0.41	0.53	0.60	0.64	0.33	0.41	0.45	0.47	0.56	0.69	0.82	0.82
Housing Permits	0.29	0.38	0.38	0.45	0.53	0.67	0.71	0.71	0.27	0.36	0.47	0.60	0.64	0.64	0.75	0.82
Mfg. & Trade Sales/Inventories	0.17	0.37	0.64	0.70	0.78	1.00	1.00	1.00	0.43	0.60	0.86	0.86	0.86	1.00	1.00	1.00
Vendor Performance	0.24	0.30	0.36	0.38	0.41	0.43	0.47	0.53	0.41	0.43	0.60	0.69	0.69	0.75	0.82	0.90
Stock Prices	0.20	0.24	0.32	0.38	0.53	0.56	0.59	0.59	0.28	0.33	0.43	0.53	0.60	0.64	0.75	0.82
Average Workweek, Mfg.	0.24	0.26	0.32	0.40	0.48	0.50	0.53	0.56	0.40	0.45	0.56	0.63	0.67	0.67	0.71	0.77
Initial Claims, Unemployment Ins.*	0.21	0.25	0.29	0.36	0.41	0.45	0.45	0.53	0.39	0.53	0.53	0.64	0.75	0.82	0.90	0.90
Change in Consumer Debt	0.34	0.38	0.40	0.50	0.56	0.67	0.71	0.71	0.27	0.31	0.31	0.50	0.53	0.56	0.69	0.69
Primary Roughly Coincident																
Nonagricultural Employment	0.18	0.56	0.77	0.83	1.00	1.00	1.00	1.00	0.50	0.77	1.00	1.00	1.00	1.00	1.00	1.00
Industrial Production	0.13	0.28	0.48	0.50	0.53	0.63	0.71	0.77	0.45	0.59	0.67	0.83	0.83	0.91	0.91	1.00
Personal Income, Less Transfer Pmts.	0.14	0.32	0.47	0.54	0.64	0.78	1.00	1.00	0.55	0.67	0.75	0.75	0.75	0.75	0.86	0.86
Manufacturing and Trade Sales	0.11	0.19	0.35	0.54	0.64	0.70	0.78	0.78	0.40	0.55	0.75	0.75	0.75	0.75	1.00	1.00
Civilian Employment/Population	0.16	0.20	0.27	0.32	0.45	0.47	0.47	0.53	0.33	0.45	0.60	0.64	0.69	0.69	0.75	0.90
Gross Domestic Product†	0.54	0.54	0.54	0.64	0.88	1.00	1.00	1.00	0.67	0.67	0.67	0.86	0.86	0.86	0.86	0.86
Primary Lagging																
Average Duration of Unemployment*	0.16	0.21	0.27	0.34	0.45	0.48	0.50	0.56	0.35	0.47	0.82	0.90	1.00	1.00	1.00	1.00
Manufacturing and Trade Inventories	0.17	0.37	0.64	0.70	0.78	1.00	1.00	1.00	0.43	0.60	0.86	0.86	0.86	1.00	1.00	1.00
Commercial & Industrial Loans	0.18	0.31	0.40	0.56	0.59	0.59	0.67	0.71	0.36	0.53	0.63	0.83	0.91	1.00	1.00	1.00
Consumer Debt/Personal Income	0.21	0.40	0.50	0.56	0.56	0.67	0.71	0.71	0.27	0.39	0.50	0.53	0.56	0.60	0.64	0.64
Chg. In Labor Cost/Unit of Output	0.26	0.31	0.38	0.39	0.41	0.43	0.43	0.45	0.36	0.53	0.75	0.82	0.82	0.90	0.90	0.90
Composite of S-T Interest Rates	0.20	0.31	0.36	0.42	0.42	0.48	0.63	0.63	0.32	0.45	0.53	0.59	0.59	0.59	0.63	0.77

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

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 one or more months and still be trending downward during the period. As long as 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, the M1 money supply in constant dollars. Under the section "Decreasing Trends During Cyclical Expansions," note that for the months of duration one through eight, the proportions are, respectively, 0.20, 0.32, 0.43, 0.47, 0.60, 0.64, 0.69, and 0.69. These data indicate that during all postwar cyclical expansions, a decrease of just one month's duration in this series later proved to have signaled a business-cycle contraction in 20 percent of such instances. Decreasing trends of two 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 one or two 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 five months' duration correctly signaled a turn in the business cycle from contraction to expansion in 60 percent of such events. Put differently, the data show that in six of every ten instances (0.60) that this series trended upward for five 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 proce-

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	0.20	0.33	0.47	0.75	1.00	1.00	1.00	1.00	0.25	0.43	0.47	0.69	1.00	1.00	1.00	1.00
Yield Curve Index	0.67	0.86	1.00	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Index of Manufacturers' Supply Prices	0.27	0.28	0.29	0.31	0.37	0.40	0.53	0.71	0.42	0.42	0.42	0.50	0.53	0.56	0.59	0.67
New Orders, Consumer Goods	0.19	0.25	0.27	0.36	0.60	0.90	1.00	1.00	0.35	0.39	0.43	0.50	0.75	0.90	0.90	1.00
New orders, Core Capital Goods	0.13	0.15	0.16	0.17	0.31	0.53	0.80	1.00	0.30	0.31	0.35	0.35	0.47	0.67	0.80	1.00
Housing Permits	0.29	0.33	0.33	0.37	0.48	0.59	0.77	1.00	0.30	0.36	0.37	0.42	0.50	0.67	0.77	1.00
Mfg. & Trade Sales/Inventories	0.17	0.50	0.78	1.00	1.00	1.00	1.00	1.00	0.50	0.70	1.00	1.00	1.00	1.00	1.00	1.00
Vendor Performance	0.24	0.26	0.26	0.26	0.35	0.43	0.47	0.75	0.41	0.41	0.41	0.43	0.53	0.69	0.69	0.69
Stock Prices	0.20	0.20	0.22	0.24	0.45	0.53	0.71	1.00	0.31	0.33	0.33	0.36	0.50	0.71	0.91	1.00
Average Workweek, Mfg.	0.24	0.38	0.48	0.67	1.00	1.00	1.00	1.00	0.40	0.63	0.67	0.91	1.00	1.00	1.00	1.00
Initial Claims, Unemployment Ins.*	0.21	0.21	0.23	0.25	0.36	0.45	0.64	0.82	0.39	0.43	0.43	0.47	0.56	0.75	0.90	1.00
Change in Consumer Debt	0.34	0.50	0.63	0.91	1.00	1.00	1.00	1.00	0.30	0.67	0.71	0.83	1.00	1.00	1.00	1.00
Primary Roughly Coincident																
Nonagricultural Employment	0.18	0.59	0.63	0.77	1.00	1.00	1.00	1.00	0.50	0.91	0.91	1.00	1.00	1.00	1.00	1.00
Industrial Production	0.13	0.20	0.29	0.45	0.67	0.91	1.00	1.00	0.45	0.53	0.59	0.77	1.00	1.00	1.00	1.00
Personal Income, Less Transfer Pmts.	0.14	0.28	0.44	0.70	1.00	1.00	1.00	1.00	0.64	0.88	0.88	1.00	1.00	1.00	1.00	1.00
Manufacturing and Trade Sales	0.11	0.20	0.27	0.54	1.00	1.00	1.00	1.00	0.47	0.70	0.78	0.88	1.00	1.00	1.00	1.00
Civilian Employment/Population	0.16	0.41	0.47	0.90	1.00	1.00	1.00	1.00	0.33	0.60	0.90	1.00	1.00	1.00	1.00	1.00
Gross Domestic Product†	0.54	0.70	0.88	1.00	1.00	1.00	1.00	1.00	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Primary Lagging																
Average Duration of Unemployment*	0.16	0.16	0.16	0.20	0.30	0.37	0.83	0.91	0.38	0.38	0.38	0.59	0.83	1.00	1.00	1.00
Manufacturing and Trade Inventories	0.17	0.50	0.78	1.00	1.00	1.00	1.00	1.00	0.50	0.70	1.00	1.00	1.00	1.00	1.00	1.00
Commercial & Industrial Loans	0.18	0.24	0.31	0.45	0.83	1.00	1.00	1.00	0.36	0.45	0.59	0.71	0.91	1.00	1.00	1.00
Consumer Debt/Personal Income	0.20	0.33	0.43	0.50	1.00	1.00	1.00	1.00	0.30	0.48	0.56	0.77	1.00	1.00	1.00	1.00
Chg. In Labor Cost/Unit of Output	0.26	0.30	0.32	0.41	0.60	0.75	1.00	1.00	0.36	0.53	0.60	0.90	1.00	1.00	1.00	1.00
Composite of S-T Interest Rates	0.20	0.21	0.22	0.26	0.42	0.48	0.67	0.71	0.32	0.32	0.32	0.33	0.43	0.53	0.67	0.67

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

dure, but applied to percentage increases from recent trough values.

To illustrate the use of Table 4, we focus again on the first primary leading series, the M1 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 33 percent of such events. When the decrease exceeded 3.0 percent, a cyclical contraction occurred 100 percent of the time. The M1 money supply series exhibited similar behavior during cyclical *contractions*. Percent *increases* of greater than 3.0 percent in M1 correctly signaled a reversal in the cycle to expansion in 100 percent of such events.

Because business activity and business cycles are ongoing 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. And 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 "ancient 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. 44).

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

Table 5
Symbols for Cyclical Statuses

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

* No discernible status.

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 and possible changes in it, 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.

A decrease in the primary leading indicators from 100 percent expanding cyclically to a lower percentage during one 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

Table 6

Statistical Indicators of Business-Cycle Changes

Change in Base Data					***Cyclical Status***		
Jul.	*Aug.*	*Sep.*	*Oct.*	***Primary Leading Indicators***	*Sep.*	*Oct.*	*Nov.*
-	+	+		M1 money supply	?	+	+
+	+	+	+	Yield Curve Index	+	+	+
-	+	-	+	Index of manufacturers' supply prices	+?	+?	?
-	+			New orders for consumer goods	+	+	+
+	-	+		New orders for core capital goods	+	+	+
+	-	+	-	New housing permits	+	+	+?
+[r]	+			Ratio of manufacturing and trade sales to inventories	+	+?	+?
-	-	-	-	Vendor performance	+?	+?	?
-	-	+	-	Index of common stock prices (constant purchasing power)	?	?	?
nc	+	-	-	Average workweek in manufacturing	+?	+?	?
-	+	-	+	Initial claims for unemployment insurance (inverted)	+	+	+
+	-	+		Change in consumer debt	-?	-?	-?
				Percentage expanding cyclically	*90*	*91*	*88*
				Primary Roughly Coincident Indicators			
+	+	+	+	Nonagricultural employment	+	+	+
+	nc[r]	+	+	Index of industrial production	+	+	+
+	+	+		Personal income less transfer payments	?	+?	+?
+	+			Manufacturing and trade sales	+	+	+
+	-	-	+	Civilian employment to population ratio	+	+	+
+	+	+		Gross domestic product (quarterly)	+	+	+
				Percentage expanding cyclically	*100*	*100*	*100*
				Primary Lagging Indicators			
+	-	-	nc	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	*60*	*50*	*50*

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.

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

As a result, we 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 zero and 100, it differs from the percent expanding series in several respects. To begin with, 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.

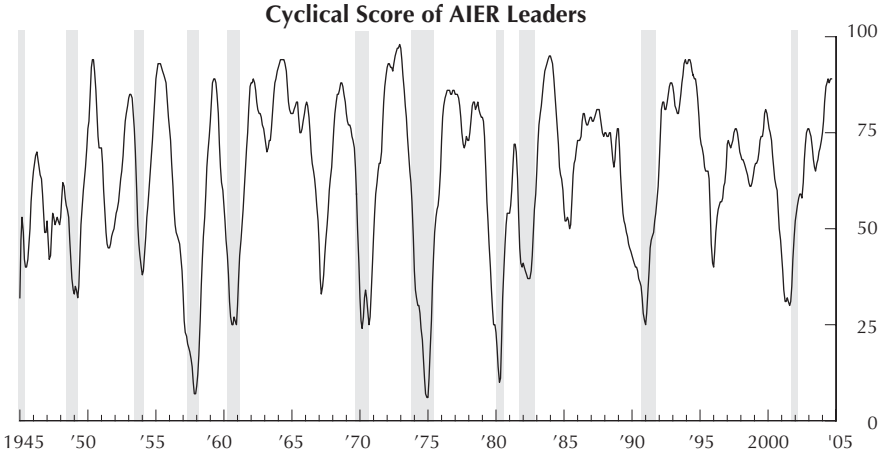
In the calculation of the cyclical score, those series that are at a new high in an established uptrend are given a score of 100, and those at a new low in an established downtrend are given a score of zero. The score for other series will depend on the extent and duration of the reversals of their most recent trend. The "cyclical score" is simply the average of the scores of the twelve 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 zero to 100. A score below 50 indicates that a recession is probable.

Chart 9

Cyclical Score of AIER Leaders



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 Conference Board 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 are 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 ÷ 20 = .75 x 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 erratic, and long moving averages (six to nine 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 diffusion indexes of different composition to be especially useful in assisting us to forecast the trend in business-cycle activity. They are depicted in Charts 10 and 11.

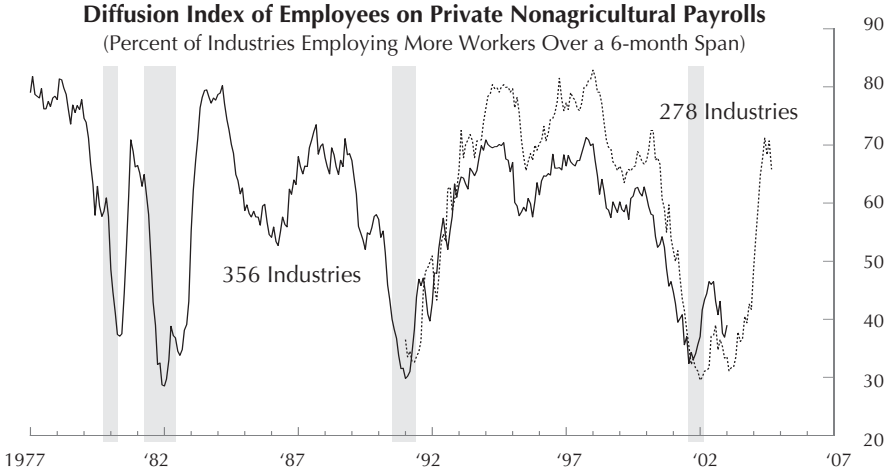
Chart 10 shows the diffusion index of the number of employees on private nonagricultural payrolls. It represents the percentage of industries employing more people than they did six months earlier. There are two lines plotted because the Bureau of Labor Statistics recently changed the way it classifies industries. The data based on the old classification system are shown for the period from 1977 to 2003, while data based on the new system are shown for 1991 through 2004. The older series (which has been discontinued) is based on a survey of employment changes in 356 industries, while the new series covers 278 industries. Historically, sharp increases in either series from cyclical lows have been accompanied by a recovery from recession.

Chart 11 shows the diffusion index of industrial production. It repre-

Chart 10

Diffusion Index of Employees on Private Nonagricultural Payrolls

(Percent of Industries Employing More Workers Over a 6-month Span)



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

sents the percentage of 295 industries producing more than they did six months earlier. Here again, large increases in this series from low levels usually have been accompanied by a recovery from recession.

Charts 12 illustrates a method we use for comparing recovery patterns from recession. These comparisons are useful for gauging if an evolving pattern in 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, the first panel of Chart 12 shows the recovery comparisons for the index of industrial production, one of our primary coincident indicators. The chart shows how industrial production has changed, relative to its level at the business-cycle trough, during the period covering 18 months before the business-cycle trough through 18 months after its occurrence. Looking at the average behavior of this series, one can see that production usually rebounds sharply during the early phase of an expansion, typically increasing by more than 10 percent in the first year. However, in 2001, industrial production did not hit its trough until one month after the recession ended, and the magnitude of the upturn that followed this trough was quite small, less than two percent.

The remaining panels in Chart 12 reveal that the employment and sales series also behaved differently from the patterns observed in previous recoveries. Employment usually begins to increase as soon as the recovery begins (i.e., right after the business-cyle trough) and it usually rebounds sharply. But after the economy began to expand in November 2001, employment continued to decrease. (It behaved similarly following the March

1991 trough of the 1990-91 recession. In this regard, both business expansions were "jobless recoveries" in their early stages.) Manufacturing and trade sales reached a trough three months before the recession ended, but its subsequent upturn was much more modest than in previous recoveries.

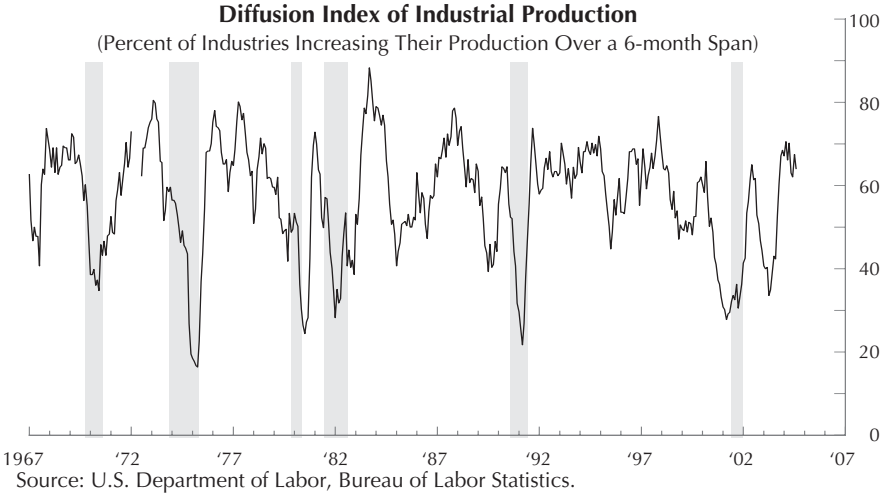
Chart 13 portrays patterns of recessions (rather than recoveries) for selected employment series. These recession comparison charts show how particular series changed twelve months before the official business-cycle peak and twelve months after its occurrence. Such comparisons are particularly useful 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 2001 recession was much milder than average.

Much of the information discussed above is more useful for forecasting imminent peaks than imminent troughs. As with many of the primary leading indicators, the supplemental evidence examined here usually 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

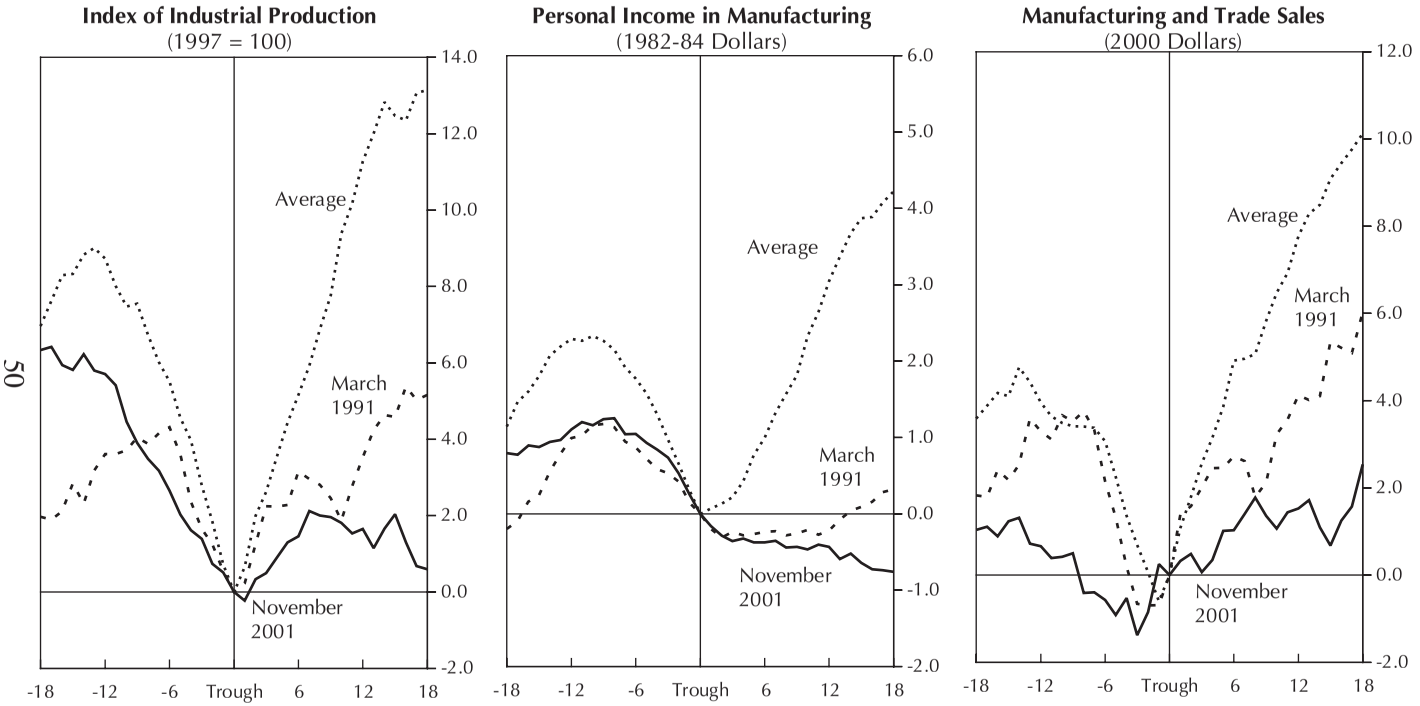
Chart 11
Diffusion Index of Industrial Production
(Percent of Industries Increasing Their Production Over a 6-month Span)



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

Chart 12

Recovery Comparisons for Selected Measures of Economic Activity

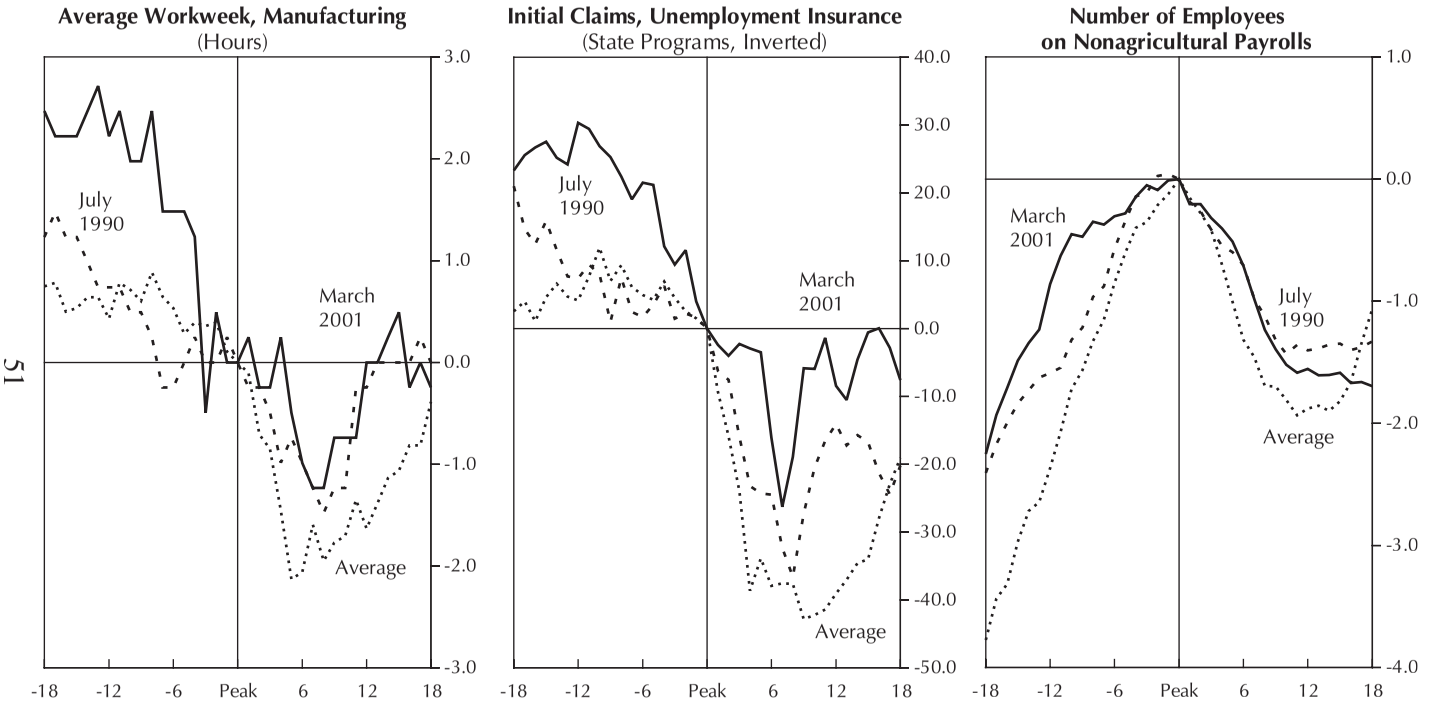


Note: The averages were calculated from the ten completed postwar recessionary periods by dropping the highest, the lowest, and the most-recent figures for each comparable month and taking a mean of the remaining seven figures. The curves show the percentage differences (vertical scale) in the series' values from the value of that series at the trough of the respective business cycle. These differences are shown for each of the 18 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, and November 2001.

Chart 13

Recession Comparisons for Selected Employment Series



Note: The averages were calculated from the ten 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 seven 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 18 months before and 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, and March 2001.

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 as to 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.

DESCRIPTIONS OF SERIES

IN this chapter we present the source of each primary statistical indicator, describe its composition, and 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, constant dollars: Board of Governors of the Federal Reserve System; U.S. Department of Commerce, Bureau of Economic Analysis. This series is an estimate of constant-dollar money balances, consisting of the money stock (M1). M1 consists of (1) currency held outside the vaults of depository institutions; (2) travelers checks; and (3) demand deposits and other checkable deposits issued by financial institutions (except demand deposits due to the Treasury and depository institutions), minus cash items in process of collection and Federal Reserve float. The data are deflated using the Personal Consumption Expenditures (PCE) Price Index.

Yield Curve Index, cumulative total: Federal Reserve Bank of Saint Louis. This series is the cumulative total of the monthly spread between the 10-year Treasury note and the effective federal funds rate. Typically, long term rates are higher than short term rates and the spread between the two is positive. As long as the yield on the 10-year note is higher than the effective federal funds rate, the yield curve index will rise. When the yield on the 10-year note is lower than the effective federal funds rate (a phenomenon known as an "inverted yield curve"), the index will turn downward. An inverted yield curve is an indication of tightening monetary policy and a signal that the bond market expects a decrease in economic activity.

Index of manufacturers' supply prices (percent of purchasing agents paying higher prices): Institute for Supply Management. This series shows the percentage of purchasing agents who report paying higher prices for products and services in the current month compared with the prices they paid during the preceding month. A higher index presumably indicates stronger demand for business inputs ***relative to supply***. The series is computed by summing the percentage of agents reporting higher prices plus one-half of those who reported no change in prices. 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.

Value of manufacturers' new orders for consumer goods and materials, constant dollars: The Conference Board; U.S. Department of Commerce, Bureau of the Census; Bureau of Labor Statistics. This series consists of all new orders for manufactured goods less capital goods, food products and petroleum products—i.e., goods used primarily by consumers (less food and energy) plus intermediate goods. The source for the current-dollar data is the M3 report from the Census Bureau. Adjustment of the data for changes in prices is done with several Producer Price Indexes.

Value of manufactures' new orders for core capital goods, constant dollars: The Conference Board; U.S. Department of Commerce, Bureau of the Census; Bureau of Labor Statistics. This series measures the value of new orders received by manufacturers in nondefense and non-aircraft capital goods industries. The source for the current-dollar data is the M3 report from the Census Bureau. Adjustment of the data for changes in prices is done using the Producer Price Index for Capital Goods.

New private housing units authorized by local building permits: U.S. Department of Commerce, Bureau of the Census. 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 Conference Board. 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 (percent of purchasing agents reporting slower deliveries): Institute for Supply Management. This series is a diffusion index that 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), inflation-adjusted: Standard and Poor's; U.S. Department of Labor, Bureau of Labor Statistics. 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. This series is deflated with the Consumer Price Index.

Average workweek of production and 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. 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 three months earlier in consumer debt outstanding: Board of Governors of the Federal Reserve System. This series is the percent change in the amount of consumer debt outstanding during the month from the amount outstanding three months earlier. Consumer debt covers most short- and intermediate-term credit extended to individuals. It 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.

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 natural resources and mining; construction; manufacturing; trade, transportation, and utilities; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services; and general government.

Index of industrial production: Board of Governors of the Federal Reserve System. This series is the most comprehensive 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 less transfer payments, constant dollars: U.S. Department of Commerce, Bureau of Economic Analysis. This series is derived by subtracting transfer payments, which are often counter cyclical, from total personal income. The Personal Consumption Expenditure (PCE) Price Index is used to remove the effect of price inflation on the series.

Manufacturing and trade sales, constant dollars: Conference Board; U.S. Department of Commerce, Bureau of Economic Analysis. 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 Conference Board.

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, constant dollars: U.S. Department of Commerce, Bureau of Economic Analysis. GDP 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 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, constant dollars: The Conference Board; U.S. Department of Commerce, Bureau of Economic Analysis. 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 Conference Board.

Commercial and industrial loans outstanding, constant dollars: Board of Governors of the Federal Reserve System; U.S. Department of Commerce, Bureau of Economic Analysis; Conference Board. This series provides a broad measure of the amount of short-term business loans outstanding. The series is compiled by summing two components: (1) The balances outstanding on loans for commercial and industrial purposes held by large domestic commercial banks; and (2) Commercial paper issued by nonfinancial companies. The data for commercial paper issued by nonfinancial companies include high-grade, unsecured, short-term, negotiable, promissory notes issued by major nonbank corporations and sold through dealers or directly to investors—usually other companies. Nonfinancial companies include public utilities and companies engaged primarily in communications, construction, manufacturing, mining, wholesale and retail trade, transportation, and services. Deflating is done using the Personal Consumption Expenditures (PCE) Price Index.

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, as are home mortgages and home equity loans. 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: The Board of Governors of the

Federal Reserve System; U.S. Department of Commerce, Bureau of Economic Analysis; Conference Board. 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, over twelve months, in the ratio of the index of compensation of employees in manufacturing to the manufacturing component of the index of industrial production. 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 30-day commercial paper rate, which itself is the average of the financial commercial paper rate and nonfinancial 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 BEA developed and used to publish each month a set of widely followed composite indexes of leading, coincident; and lagging indicators; in 1996 the Conference Board (see below) took over responsibility for this. The most important criteria used by the BEA-Conference Board to select and group the components of these indexes is cyclical timing.

Conference Board: A private, nonprofit research organization that conducts and publishes research on economic trends and management practices. In 1996, the Conference Board assumed responsibility for producing and disseminating the statistical indicators previously maintained by the BEA (above), including the BEA's composite indexes. 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 fore-

casts 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 increasing prices, cyclical movements of activities reported in current dollars (dollars reflecting current purchasing power) are often 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. The "Percentage of AIER Leading Indicators Expanding" is a diffusion 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 dur-

ing 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 six months, decreased for two months, and then resumed the upward trend, the two-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 one, while the most erratic series we use may have an MCD as high as six. 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 three-month moving average is the arithmetic average of the data for the three most recent months. That figure usually is plotted at the center month. A three-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 three-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.

APPENDIX

FORECASTING THE 2001 RECESSION: HOW WELL DID AIER (AND OTHERS) DO?

Recessions put economic forecasters to the test. Comparisons of various forecasts with the 2001 recession reveal that AIER's predictions were more timely and accurate than forecasts that predicted economic growth rates with decimal-point precision.

The 2001 recession provided us with a rare opportunity: the chance to see how well AIER's forecasting approach performed during a business contraction. Recessions have become unusual events in U.S. history. There were eight of them in the first 40 years following the end of World War II, but in the past 20 years there have been just two. So the recession of 2001 is a particularly important episode for purposes of examining how well our analysis of business conditions fared.

First, let's look at how other forecasters did. A key difference between AIER's approach and other methods of forecasting is that we do not provide *quantitative* forecasts. That is, we never predict that the economy will grow, say, 2.5 percent in the next quarter, or 3.2 percent next year. We only say whether we think the economy is likely to expand or to contract. In our opinion, forecasting specific rates of economic activity is futile. Comparisons of such forecasts with actual events repeatedly have shown that they fail the acid test of any forecast: accuracy. They are especially likely to be wrong at cyclical turning points in business activity—yet it is just at these turning points that inaccurate forecasts may prove most costly to the user.

Nevertheless, such specific forecasting continues apace. The Survey of Professional Forecasters is an example. This survey is conducted quarterly by the Federal Reserve Bank of Philadelphia, and it compiles the predictions of a large group of professional forecasters regarding various economic measures such as GDP, unemployment, and price inflation.

Economists James Stock and Mark Watson recently examined the predictions made in this Survey to see how well they performed during the 2001 recession. For the year 2000, 36 forecasters and forecasting groups were included in the Survey.[1]

The accompanying table shows their median forecasts for the growth rate of real Gross Domestic Product (GDP), by quarter, for late 2000 through the

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[1] James H. Stock and Mark W. Watson, "How Did Leading Indicator Forecasts Perform During the 2001 Recession?" *Economic Quarterly*, Federal Reserve Bank of Richmond, Summer 2003. Available at www.rich.frb.org/pubs/eq/.

third quarter of 2002. (The median is the halfway point. Half of the forecasters predicted faster growth rates and half predicted slower growth.) The first two columns show the quarter being forecast and the actual percent change in real GDP, based on the latest available estimate as of this writing. The remaining columns show the median forecasts; the date at the top of each column is the quarter in which the forecast was made.

For example, as of the first quarter of 2000 the median forecast for 2000 Q4 was for real GDP to increase by 2.9 percent (this is the top left figure in the forecast columns.) As 2000 unfolded, forecasters raised their forecast for 2000 Q4 to 3.1 percent and then 3.2 percent (read across the top row of forecasts to see this). However, the actual growth rate of real GDP in 2000 Q4 was just 1.1 percent.

The 2001 recession began in March and ended in November, and GDP growth was negative for the first three quarters of 2001. But as the table reveals, forecasts made in the quarters leading up to the recession predicted that GDP would grow at a healthy rate in 2001. The forecasts made in 2000 Q4 predicted that real GDP would grow by 3.3 percent in 2001 Q1, the very next quarter. In fact, GDP actually decreased by 0.6 percent. Similarly, the 2001 Q1 forecast was for GDP to grow by 2.2 percent in 2001 Q2, but it actually fell by 1.6 percent.

In the fourth quarter of 2001, the forecasters finally predicted that GDP would decrease. Because the Commerce Department does not release its GDP estimates until after the quarter is over, forecasters made predictions for 2001 Q4 while the quarter was still underway. They predicted that GDP

Median Forecasts of the Percentage Growth in Quarterly GDP from the Survey of Professional Forecasters

Target Date		*Forecasts Made In*							
		2000				*2001*			
Quarter	*Actual Growth*	*Q1*	*Q2*	*Q3*	*Q4*	*Q1*	*Q2*	*Q3*	*Q4*
2000Q4	1.1	2.9	3.1	3.2	3.2				
2001Q1	-0.6	2.8	2.6	3.0	3.3	0.8			
2001Q2	-1.6		2.9	2.7	3.2	2.2	1.2		
2001Q3	-0.3			3.2	3.3	3.3	2.0	1.2	
2001Q4	2.7				3.2	3.7	2.6	2.8	-1.9
2002Q1	5.0					3.7	3.1	2.7	0.1
2002Q2	1.3						3.6	3.0	2.4
2002Q3	4.0							3.9	3.6

Notes: Entries are quarterly percentage growth rates of real GDP, at an annual rate. Actual GDP growth is from the latest GDP release by the Bureau of Economic Analysis. Forecasts are the median forecast from the Philedelphia Federal Reserve Bank's Survery of Professional Forecasters. Reprinted from Stock and Watson.

would fall by 1.9 percent. As it turned out, the recession ended in November and GDP actually increased by 2.7 percent. In short, by the time the forecasters decided the economy was going to contract, the recession was over.

They also failed to anticipate how robust the initial recovery would be. In 2001 Q4, they predicted that GDP would increased by just 0.1 percent in the next quarter. The actual growth rate in 2002 Q1 was 5.0 percent.

The 2001 recession was not the only one that forecasters failed to predict. Most of them missed the call on the 1990-91 recession, and the onset and severity of the 1973-75 and 1981-82 recessions also were not widely anticipated.[2] For all their decimal-point precision, the predictions of quantitative forecasters have a very poor record at business-cycle turning points.

AIER's Approach

AIER's goal in forecasting is modest. We use our statistical indicators of business-cycle changes to forecast reversals in such cycles just prior to or shortly after their occurrence or to predict continuations of trends. To date we have not found the indicators useful for forecasting the magnitude of probable changes. Nevertheless, because reversals in cyclical trend 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 continuation of trends, would seem to be useful.

For half a century, AIER has evaluated its statistical indicators of business-cycle changes on at least a monthly basis. Our approach has been to appraise each series individually in the light of its most recently reported fluctuations. This leads to a compilation of the "percent of AIER leaders expanding" series. This is a record of the monthly deliberations of our professional staff, examining the data as they were reported at the time. As such, the percent-expanding series is never revised after the fact.

The percent of leaders expanding is calculated by dividing the number of leading indicators that are appraised as expanding by the number of series for which a trend is evident. When less than 50 percent of the leaders are expanding, a contraction in business-cycle activity is probable.

Our record over the past 50 years is respectable. We forecast most of the nine recessions during this period one to seven months before they began. The one instance when the percent expanding did not signal a recession until after the business-cycle peak was in 1981. This was mainly a reflection of the brevity (12 months) of the preceding expansion. Some analysts

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[2] See Stephen K. McNees, "Forecasting Cyclical Turning Points: The Record in the Past Three Recessions," *New England Economic Review*, Federal Reserve Bank of Boston, March/April 1987.

believe that the entire July 1980-April 1982 period was recessionary, given that most of the coincident indicators did not exceed their 1980 peaks until well after the post-1982 expansion began.

There have been some false signals. In 1951-52, 1962, 1965, and 1967 (all of which were periods when we used all 12 leaders as the denominator of the percent expanding, rather than only those for which a trend was evident), and 1986, we concluded that a business-cycle contraction was likely, but growth was only slowed or briefly interrupted and no recession was declared.

Our Record in the 2001 Recession

The percent of AIER leaders expanding dropped below 50 in December 2000. Thus, it accurately warned of the 2001 recession three months before it began. At the time, we wrote that "the amber light is flashing." However, we held off saying that a recession was imminent, primarily because our other main forecasting tool, the cyclical score, was not yet signaling recession.

The cyclical score is based on a separate, purely mathematical analysis of the leading indicators. Each month, the most current data for the indicators are processed by a computer to calculate the score. Unlike the percent of AIER leaders expanding, which is a permanent record of the deliberations of the professional staff, the entire history of the cyclical score is recalculated each month. No human judgment is involved, beyond the selection of the series to input into the computer and the designation of the number of months needed to establish an upward or downward trend for each series. By minimizing the role of human judgment, which can be unduly swayed by the latest news stories or the conventional wisdom, we hope to avoid forecasting errors, such as calling for recessions that do not happen.

Our cyclical score did serve to restrain us from calling for a recession in 1995, when the percent expanding series dipped well below 50. As originally calculated (that is, using the data available at the time) the cyclical score never dropped below 50. The score—again, as originally reported—also kept us from calling for a recession after the percent of leaders expanding dropped below 50 in December 2000. It did not fall below 50 until May 2001. Therefore, between December and May we said that a slowdown of general business activity was likely but that it was not clear whether it would develop into an outright recession.

In May 2001, when the score fell below 50, we said that a contraction of business activity was likely. We also noted that "when the history is written it could well be that the peak will be identified as having occurred some time during the first quarter." In July we wrote that a recession probably had begun. Some months later, economists identified March as the official turning point.

We probably would have forecast the recession a few months earlier had we ignored the cyclical score and relied only on the percent expanding. The score helps us avoid false signals, but the trade-off is that, in the 2001 episode at least, our correct signal of a turning point in the business cycle was less timely.

As noted, the cyclical score is revised every month to reflect any and all historical revisions to the 12 leading indicators. Interestingly, the revised score *did* decrease below 50 prior to the 2001 recession. Incorporating the most recently available data as of this writing, the score fell to 46 in December 2000, the same month the percent of leaders expanding fell below 50.

The lower revised score reflects three things. First, when the recession actually began in March 2001, economic data for most of the leaders were available only through January or even December. As more complete data became available they were incorporated into the score. Second, some of the original economic data were later revised. For example, in 2001 it looked like one of the leading indicators, the *ratio of sales to inventories*, had increased strongly throughout the late 1990s. The most recent revised data show that the ratio hardly changed.

Third, we changed one of our leading indicators. For most of 2001 we were unable to get new data for *contracts and orders for plant and equipment,* which measures capital spending by businesses—a key factor in the 2001 recession. We eventually switched to another series that tracks business investment, *new orders for nondefense capital goods*, and the sharp drop in this series in 2001 helped to lower the revised cyclical score.

Summary

Overall, the poor performance of quantitative forecasters before and during the 2001 recession supports our view that such forecasts are of little use. They failed to predict the recession before it happened and failed to recognize it while it was underway. By the time they did predict that GDP would fall, the economy had begun to grow again.

Our goal of providing a warning of a turning point in the business cycle (while not issuing false alarms about recessions that never materialize) is more modest but also more attainable. The percentage of AIER leaders expanding signaled the recession three months before it began. We warned readers that there was likely to be a slowdown in economic activity, but because the cyclical score was still high we did not predict that a recession was likely until two months after it began. Shortly after that we said a recession had probably begun. All in all, we think that while our record in 2001 leaves room for improvement, we told readers where the economy was headed with better timing and accuracy than many other forecasters.

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