

The Development and Analysis of Economic Indicators*

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INDICATORS AND BUSINESS CYCLES

Business cycles, large and small, appear to be a continuing feature of the economic landscape. A turn up or down in the economy is clearly an event of major social significance. Considerable interest therefore attaches to the means whereby an economic turn can be forecast and its extent can be estimated. That is the role of *economic indicators*, which rest on the numerous measurements of the pulse of the economy made by government agencies, private organizations, and individual economists. The analysis of economic indicators is a well-developed technique for ascertaining what the many pulse readings are saying about the state of the economy.

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Economic indicators have come to embrace virtually all the quantitative measures of economic change that are continuously available. One can find daily, weekly, monthly, and quarterly indicators; they measure production, prices, incomes, employment, investment, inventories, sales, and so on; and they record plans, commitments, and anticipations as well as recent transactions. Some of the indicators, such as the unemployment rate or the Consumer Price Index, are calculated by the Federal Government on the basis of elaborate sampling surveys conducted each month. Others, such as the indexes of stock market prices and the surveys of purchasing agents' views of prices, orders, and inventories, are constructed by private organizations on the basis of information they collect or obtain as a by-product.

As a result economists or business people interested in forecasting change are faced, like weather forecasters, with a mass of factual information that pours in constantly. They must assess in some systematic way what the information says about the present and the future. The technique of *indicator analysis* embraces various systematic ways of looking at this information with a view to assessing the present situation and discerning significant future developments in the business cycle.

One of the earliest systems of the kind, devised shortly before World War I, came to be known as the Harvard ABC curves. The A curve was an index representing speculation, more specifically stock prices. The B curve represented business activity, measured by the dollar volume of checks drawn on bank deposits. The C curve represented the money market, measured by the rate of interest on short-term commercial loans. Historical studies, particularly those carried out by Warren Persons at Harvard University, showed that these three curves typically moved in sequence: stock prices first, bank debits next, and interest rates last, with the lagging turns in interest rates preceding the opposite turns in stock prices. The economic logic of the sequence was that tight money and high interest rates led to a decline in business prospects and a drop in stock prices, which led to cutbacks in investment and a recession in business. The recession in turn led to easier money and lower interest rates, which eventually improved business prospects, lifted stock prices, and generated a new expansion of economic activity.

The system came to grief in the Great Depression of 1929 because the interpreters of the curves took too optimistic a view and failed to foresee the debacle. Economists generally regard the episode as one of the great forecasting failures of all time.

Curiously, however, the sequence of events on which the system was originally based has in large measure persisted. This is not to say that the ABC curves would still suffice if they were revived. Far more comprehensive systems of indicators have been developed since 1929, and the empirical and theoretical base on which they stand has been more thoroughly studied, documented, and tested.

The sharp recession of 1937–1938, which occurred before the economy had fully recovered from the Great Depression, helped to spur that development. In the autumn of 1937, Henry Morgenthau, Jr., the Secretary of the Treasury,

asked the National Bureau of Economic Research (a private, nonprofit research agency) to devise a system of indicators that would signal when the recession was nearing an end. At that time the quantitative analysis of economic performance in the United States did not approach today's standards. The Government's national income and product accounts, which form the foundation of much of modern economic analysis, were just being established. Other vital economic statistics, including unemployment rates, were being developed or refined by public agencies trying to provide information that would be useful in fighting the Depression. Few statistical series were issued in seasonally adjusted form, as they are now. Comprehensive econometric models (systems of equations expressing quantitative relations among economic variables), which are widely employed now to forecast the economy and to evaluate economic policies, were virtually unknown then.

Under the leadership of Wesley C. Mitchell and Arthur F. Burns, the National Bureau of Economic Research had since the 1920s assembled and analyzed monthly, quarterly, and annual data on prices, employment, production, and other factors as part of a major research effort aimed at gaining a better understanding of business cycles. This project enabled Mitchell and Burns to select a number of series that, on the basis of past performance and of relevance in the business cycle, promised to be fairly reliable indicators of business revival. The list was given to the Treasury Department late in 1937 in response to Morgenthau's request and was published in May 1938. Thus originated the system of leading, coincident, and lagging indicators widely employed today in analyzing the economic situation, determining what factors are favorable or unfavorable, and forecasting short-term developments.

Since 1938 the availability and the use of economic indicators have been greatly expanded under the leadership of the National Bureau of Economic Research, the U.S. Department of Commerce, the Organization for Economic Cooperation and Development in Paris, and other public and private agencies. The list of indicators assembled in 1937 was revised in 1950, 1960, 1966, and 1975 to take into account new economic series, new research findings, and changes in the structure of the economy. A new evaluation has recently been conducted by the Center for International Business Cycle Research at Columbia University. With each revision the performance of the indicators both before and after the date of their selection has been carefully examined and exposed to public scrutiny.

In 1957 Raymond J. Saulnier, who was then chairman of the President's Council of Economic Advisers, asked the Bureau of the Census to develop methods whereby the appraisal of current business fluctuations could take advantage of the large-scale electronic data processing that was becoming available, with the results to be issued in a monthly report. Experimental work done over the next few years under the leadership of Julius Shiskin, who was the chief economic statistician of the Bureau of the Census, resulted (in 1961) in the monthly publication by the Department of Commerce of *Business Cycle Developments*. (It is now called *Business Conditions Digest*; under both names economists refer to it as BCD.) This publication has greatly increased the

accessibility of current indicator data and of various statistical devices that aid in their interpretation. As a result the indicators have become a major economic forecasting tool.

USEFUL QUALITIES OF INDICATORS

As noted above, the analysis of economic indicators rests on both an empirical and a theoretical foundation. The selection of particular indicators and the emphasis given to them have been guided by what is understood of the causes of business cycles. Obviously one would wish to examine recent changes in any economic process that is believed to play a significant role in any widely accepted explanation of cyclical fluctuations.

Many different explanations have been advanced for these fluctuations. Some of them place primary stress on the swings in investment in inventory and new plant and equipment that both determine and are determined by movements in final demand. Others assign a central role to the supply of money and credit, or to Government spending and tax policies, or to relations among prices, costs, and profits.

All these factors undoubtedly influence the course of business activity. Some of them may be more important at a given time than others. No consensus exists, however, on which is the most important or even on how they all interact. Hence it is prudent to work with a variety of indicators representing a broad range of influences. Ready access to a wide range of indicator data enables one to test competing or complementary hypotheses about current economic fluctuations.

With this principle in mind, economic activities can be classified into a few broad categories of closely related processes that are significant from the business cycle point of view. Indicators have been selected from each group. The principal categories now included in *Business Conditions Digest* are shown in the lefthand column of Table 1. Note that these categories do not include all aspects of the economy. For example, statistics on agriculture; Federal, state, and local government; foreign trade; and population and wealth are omitted. Nevertheless, the categories do provide a framework of factors that enter into theories of the business cycle and are important in assessing the performance of the economy. The omitted categories are important, too, but supply few indicators that are systematically related to the business cycle.

Within each category, research on business cycles has uncovered indicators that behave in a systematic way. These findings have provided a basis for selecting particular indicators and classifying them according to their characteristic cyclical behavior, as in Table 1. Two of the chief characteristics one looks for are the regularity with which the indicator conforms to business cycles and the consistency with which it leads, coincides, or lags at turning points in the cycles. Other relevant considerations are the statistical adequacy of the data (since the statistical underpinning of an indicator has a bearing on how well the indicator represents the process it is supposed to reflect), the smoothness

Table 1 Cross-classification of economic indicators

Economic Process	Relation to Business Cycle		
	Leading	Roughly Coincident	Lagging
Employment and unemployment	Average workweek and overtime Hiring and layoff rates New unemployment insurance claims	Total employment	Long-duration unemployment
Production and income		Real GNP Industrial production Personal income	Backlog of investment commitments Investment expenditures
Consumption, trade, orders, and deliveries	New orders, consumer goods Vendor performance	Retail sales Manufacturing and trade sales	Inventory levels
Fixed capital investment	New investment commitments Formation of business enterprises Residential construction		Change in consumer prices Change in unit labor costs
Inventories and inventory investment	Inventory investment and purchasing	Change in producer prices	Outstanding debt Interest rates
Prices, costs, and profits	Change in industrial materials prices Stock prices Profits and profit margins		
Money and credit	Money and credit flows Credit delinquencies and business failures Bond prices		

of the data (since highly erratic series are difficult to interpret correctly), and the promptness with which the figures are published (since out-of-date figures have a limited bearing on the current situation).

Empirical measures of these characteristics have been constructed for large numbers of indicators. Such measures have been employed in the attempt to obtain data capable of conveying an adequate picture of the changes in the economy as it moves through stages of prosperity and recession. In addition, the behavior of the indicators after they have been selected has been monitored closely. Many of the indicators have survived several successive evaluations. For example, measures of the average workweek, construction contracts, and stock prices have been on every one of the successive lists of indicators that have been drawn up by the National Bureau of Economic Research since 1937.

The same lists of indicators have also been tested by their performance in other countries. Every new recession or slowdown, whether in this country or abroad, provides additional evidence against which the indicators can be assessed, as does every upturn. This examination and reexamination has accumulated a large amount of empirical evidence that demonstrates both the value of the indicators and their limitations.

SEASONAL ADJUSTMENT AND SMOOTHING

A sampling of this evidence is contained in the accompanying illustrations. Let us consider an indicator such as the number of building permits issued for new houses (see Figure 1). The raw data are statistically decomposed in order to measure and eliminate regular seasonal variations that are repeated every year. When this factor is removed, the indicator reveals much more clearly the tendency for permits to diminish during the recessions of 1980 and 1981–1982 and to increase when more prosperous conditions returned in 1983.

Most economic indicators today are available in seasonally adjusted form. Some of them are seldom reported in any other way. Examples of indicators that are invariably adjusted for seasonal factors include the gross national product, the unemployment rate, and the index of industrial production. One of the computer programs that is widely used to make seasonal adjustments, developed by the Census Bureau, is called the X-11 program. (See also the article by Leon and Rones for a discussion of seasonal adjustment.)

The smoothing of irregular movements is less commonly practiced because the techniques are somewhat less routine. Certain statistical series, however, are subject to much wider irregular movements than others because of differences in sampling error or in the effects of such factors as unusual weather or labor disputes. It is therefore useful in interpreting current changes to have a standard measure of the size of these irregular fluctuations compared with the size of the movements that reflect long-term trends and the events of the business cycle, which are often called *trend-cycle movements*.

Two measures of this kind are provided for all the indicators carried in *Business Conditions Digest*. One shows how large the average monthly change

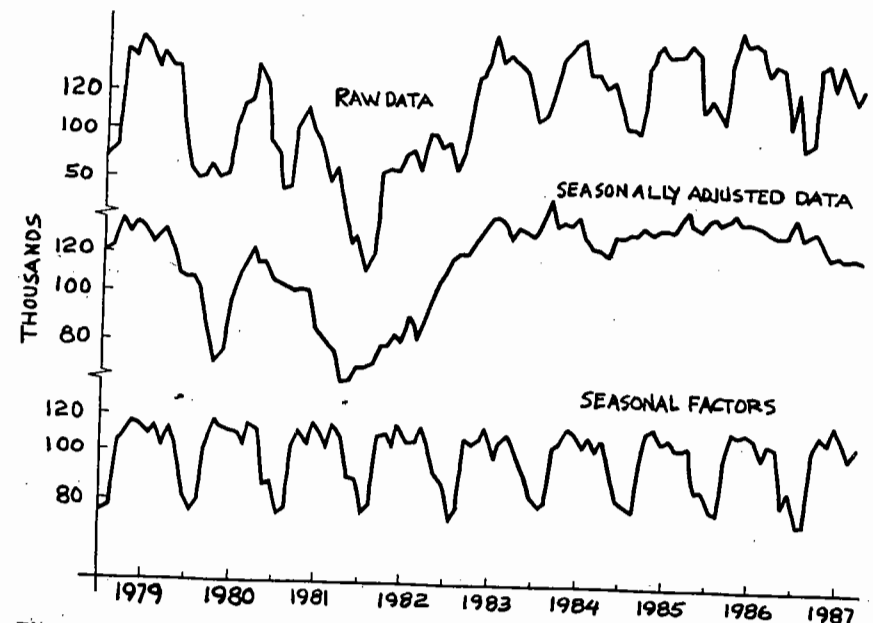


Figure 1 Building permits for new houses, before and after seasonal adjustment. Source: Department of Commerce.

in the irregular component is with respect to the average monthly change in the trend-cycle component. The other shows how many months must elapse on the average before the change in the trend-cycle component, which builds up over a period of time, exceeds the irregular component, which does not. For example, the measures show that monthly changes in housing starts are likely to be dominated by "noise" (such as random variation), but that when these changes are measured over spans of four months, the trend-cycle "signal" becomes dominant. On the other hand, the index of industrial production is much less affected by noise, so that monthly movements are more significant.

LEADS AND LAGS

The most important characteristic of an indicator from the point of view of forecasting is of course the evidence it provides concerning future changes in economic activity. Indicators differ in this respect for numerous reasons. Certain types, such as housing starts, contracts for construction, and new orders for machinery and equipment, represent an early stage in the process of making decisions on investment. Since it takes time to build a house or a factory or a turbine, the actual production (or completion or shipping) usually lags behind the orders or contracts. The lag depends on, among other things, the volume of unfilled orders or contracts still to be completed. Where goods are

made for stock rather than to order there may be no lag because orders are filled as they are received.

Another kind of lead-lag relation exists between changes in the workweek on the one hand and employment on the other. In many enterprises employers can increase or decrease hours of work more quickly, more cheaply, and with less of a commitment than they can hire or fire workers. Hence in most manufacturing industries the average length of the workweek usually begins to increase or decrease before a corresponding change in the level of employment. The workweek is therefore a leading indicator with respect to the unemployment rate.

Many bilateral relations of this kind have been traced (see Figure 2). The matter obviously becomes more complex, however, when the relations are multilateral. Indexes of stock market prices, for example, have exhibited a long-standing tendency to lead changes in business activities (the Harvard ABC curves relied in part on this tendency), but the explanation seems to require the interaction of movements in profits and in interest rates, and other factors as well. A cyclical decline in profits often starts before a business expansion comes to an end; the proximate cause is usually a rapid rise in the costs of production. Interest rates also are likely to rise sharply. Both factors operate to reduce the attractiveness of common stocks and depress their prices, even though the volume of business activity is still rising. Near the end of a recession the opposite tendencies come into play and lift stock prices before business begins to improve. Since interest rates are generally counted among the lagging indicators, this case illustrates that even lagging indicators can play a role in forecasting, by affecting the movements of the leading indicators.

For the purpose of measuring leads and lags a chronology of business cycles has proved useful. The National Bureau of Economic Research has defined business cycles in such a way that peaks and troughs can be dated with reasonable objectivity. Indeed, some parts of the dating procedure can now be carried out by computer. Since the vast majority of indicators that are of interest show cyclical movements conforming to business cycles, the peaks and troughs in each indicator can be matched with those of the business cycle to determine characteristic leads and lags.

Following this plan, groups of indicator series that typically lead, coincide with, or lag behind turns in the business cycle have been identified, as illustrated in Table 1. Composite indexes constructed from these groups (see Figure 3) can be employed (as individual indicators can) to measure the relative severity of an economic downturn as it progresses from month to month. With such a monitoring scheme one can observe the relative severity of the current decline and draw certain inferences based on the fact that the severity rankings among different recessions have usually not changed a great deal after the first few months.

It is of course essential in any appraisal of the economic outlook to take into account actual and prospective policy actions by the Government. Such actions include tax reductions or increases, changes in required bank reserves, changes in military expenditures, and the establishment of programs of public employment. Such actions often do not fit readily into the framework of indicators,

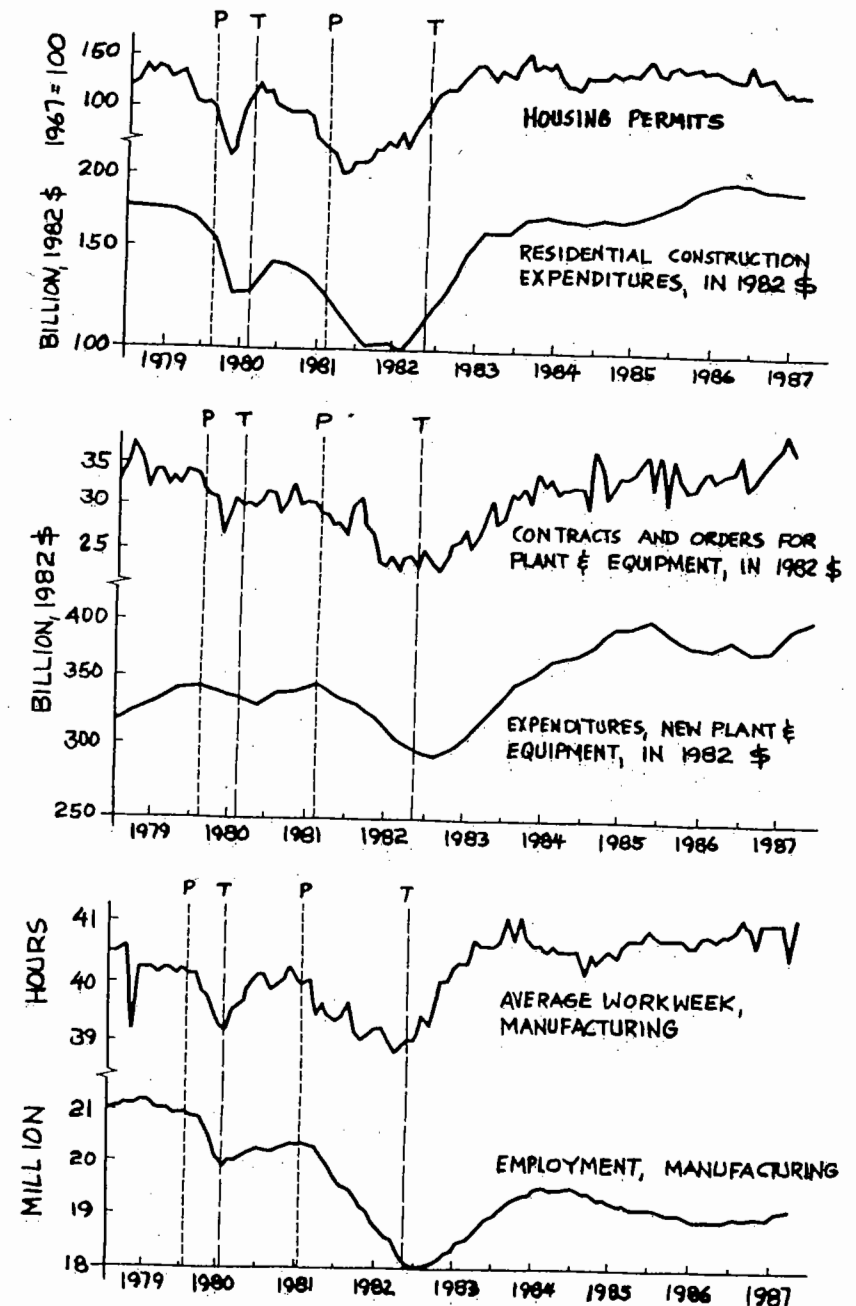


Figure 2 Three leading indicators and the activities they lead. Note: Vertical lines are business cycle peaks (P) and troughs (T). Sources: Department of Commerce and Bureau of Labor Statistics

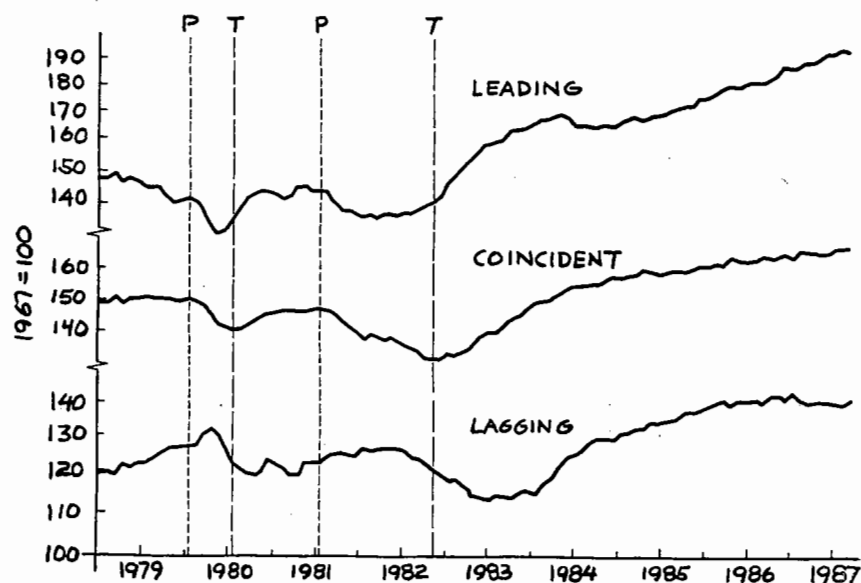


Figure 3 Leading, coincident, and lagging indexes for the United States. Note: Vertical lines represent business cycle peaks (P) and troughs (T). Source: Department of Commerce.

although their effects, together with other influences, may be registered promptly in orders, contracts, housing starts, stock prices, and so on. Still, certain indicators do provide a nearly continuous reading on Government activities, although they have generally not been found sufficiently systematic in their relation to business cycles to warrant selection as leading, coincident, or lagging indicators.

INTERNATIONAL ASPECTS

Economic indicators of all types are followed more widely in the United States than in most other countries. The growth of trade, travel, and international finance, however, has increased the need for promptly available statistics on international transactions and economic development in other countries. In 1973 the National Bureau of Economic Research began a program of assembling and analyzing indicators for a dozen industrial countries, and since 1979 this program has been carried forward by the Center for International Business Cycle Research.

Fortunately the indicator approach is sufficiently flexible to be adapted readily to situations where, as in many countries since World War II, economic recessions have taken the form of retarded growth of aggregate activity rather than absolute declines and where such retardation may have been deliberately induced by government policies in order to cool off inflation or restore a

deteriorating trade balance. Moreover, the approach is flexible enough to accommodate differences among countries in the types of indicator data that are available or are most revealing. For example, in Europe, statistics on job vacancies are relied on more than in the United States, and data on the international migration of workers are more significant because migrant workers are a significant part of the work force.

The pursuit of economic indicator analysis on an international scale, by international agencies as well as by domestic institutions, has demonstrated the feasibility of the approach and its potential value in observing and appraising international fluctuations in economic growth rates and the accompanying trends in price levels, foreign trade, capital investment, and employment. One can envision the evolution of a worldwide system of indicators, built on the plan originally developed for the United States, to support the analysis of economic indicators on a global scale.

PROBLEMS

1. Why are seasonally adjusted data used in analyzing business cycles?
2. What do the leading indicators lead?
3. What qualifications should a good economic indicator possess?
4. Political candidate A says a recession has begun because stock prices have dropped. B says no, because employment is still rising. How would you decide who is right?
5. The following figures are from the July 1975 issue of *Business Conditions Digest*.

	Leading Index	Coincident Index (1967 = 100)	Lagging Index
July 1974	145.3	138.8	210.5
Aug. 1974	140.4	138.2	214.5
Sept. 1974	135.0	137.4	216.3
Oct. 1974	130.1	136.2	219.0
Nov. 1974	126.0	132.3	220.4
Dec. 1974	123.6	128.2	220.0
Jan. 1975	118.7	125.2	217.8
Feb. 1975	118.6	124.1	212.9
Mar. 1975	120.3	122.0	210.1
Apr. 1975	124.8	122.2	205.5
May 1975	127.9	122.4	201.5
June 1975	130.7	124.6	200.2

Considering the fact that a recession began in November 1973, do you think it has ended and if so, when? What confirming evidence would you like to have?

6. How can leading indicators for another country, say, Japan, be helpful to business firms in the United States?
7. In deciding whether to invest in stocks or in bonds, what economic indicators would you examine?

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