

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Business Cycles, Inflation, and Forecasting, 2nd edition

Volume Author/Editor: Geoffrey H. Moore

Volume Publisher: Ballinger

Volume ISBN: 0-884-10285-8

Volume URL: <http://www.nber.org/books/moor83-1>

Publication Date: 1983

Chapter Title: An Introduction to International Economic Indicators

Chapter Author: Geoffrey H. Moore

Chapter URL: <http://www.nber.org/chapters/c0692>

Chapter pages in book: (p. 65 - 92)

## Chapter 6

# An Introduction to International Economic Indicators

For many years a system of leading, coincident, and lagging economic indicators, first developed in the 1930s by the National Bureau of Economic Research, has been widely used in the United States to appraise the state of the business cycle. Since 1961 the current monthly figures for these indicators have been published by the U.S. Department of Commerce in *Business Conditions Digest*. Similar systems have been developed by government or private agencies in Canada, Japan, the United Kingdom, and more recently in many other countries. Because of differences in content or methodology, however, these independent efforts do not provide comparable materials. In 1973 the NBER Bureau began to develop an international economic indicator system (IEI) that would provide comparable data, organized and analyzed in a comparable manner, for a number of industrial countries. The Center for International Business Cycle Research at Rutgers University in New Jersey has continued this work since 1979. The research has demonstrated that such a system can be helpful in tracking an international recovery or recession, in revealing factors that are holding back recovery or leading to recession, in anticipating changes in foreign trade flows, and in providing early warning of new inflationary trends. The Organization for Economic Cooperation and Development (OECD) and statistical agencies in Canada, the United Kingdom, West Germany, France, Italy, Japan, and the United States have cooperated with the NBER and with the Rutgers Center in compiling and analyzing the current data for this

Reprinted from *International Economic Indicators: A Sourcebook*, by Geoffrey H. and Melita H. Moore, Greenwood Press, forthcoming.

system of indicators. The practical results of this research program are now available for use.

In this chapter the functions of the indicator system are explained and the evidence summarized concerning its strength and weaknesses, and it is demonstrated how the system can be used to forecast business cycles, exports and imports, and inflation rates.

## FUNCTIONS OF THE IEI SYSTEM

The first NBER study of business cycle indicators, conducted in 1937 by Wesley C. Mitchell and Arthur F. Burns, had as its immediate objective the use of indicators to signal a cyclical revival—that is, the ending of a recession, specifically the ending of the severe recession in the United States that began in spring 1937. When the work was taken up again after World War II, the objective was broadened to include signals of a cyclical downturn, and NBER studies completed in 1950, 1960, and 1966 as well as a Commerce Department study in 1975 focused on both the beginning and the end of recessions. An international system designed along similar lines should signal both peaks and troughs in each of the countries covered as well as in several countries taken together. In short, an important function of the IEI system is to detect a worldwide recession or recovery promptly. The importance of this function is underlined by the fact that international recessions—those in which many countries participate more or less simultaneously—have been more serious than localized recessions. One need only point to 1973–1975 and 1980–1982 to find examples of recessions that were both serious and international.

A second, and closely related, function of the indicator system is to measure the scope, severity, and unusual features of an international recession or recovery while it is in progress. For example, during the 1975–1976 recovery in the United States it became common practice, in reports devoted to the economic outlook, to compare the current recovery with previous recovery periods in this country. Similar comparisons were made during the 1980 recession. News magazines, business journals, annual reports of corporations, government reports, and newspapers used this device as a method of appraisal. But few of the publications made such comparisons for other countries, despite their relevance from a world point of view or their value in the diagnosis of specific problems pertaining to other countries. One of the reasons is that the necessary information is not readily accessible. An international economic indicator system should en-

able comparisons of this type to be made routinely and kept up to date.

A third function is to help appraise prospects for foreign trade. The leading indicators are sensitive measures of the general state of demand. Although many other factors affect the volume of exports and imports, demand is surely fundamental. A trade deficit can come about because of sluggish demand for exports from a country's trading partners while its own demand for imports is growing. Since the leading indicators include such demand-related factors as new orders, inventory change, hiring rates, and profitability, one can expect that they would relate to the demand not only for domestic goods but also for foreign products. Leading indicators for an importing country, therefore, should tell us something about how much it is likely to import, or how much its trading partners are likely to export to it. The international indicator system should therefore help us anticipate changes in the flow of trade to the countries for which leading indicators are available as well as changes in the trade balances among these countries.

Fourth, a system of international indicators can provide early warning signals of an acceleration or deceleration in the rate of inflation. Inflation is in part a demand phenomenon, and, as noted before, many of the indicators are demand oriented. Inflation is also an international phenomenon. All countries experience it, and waves of inflation often occur at about the same time in many countries. An appropriate set of international indicators should show how the price system responds to and feeds back upon the rest of the economy, including, of course, those variables that are under some degree of policy control, such as the money supply, the flow of credit, or the fiscal deficit.

### **LEADS AND LAGS IN RECOVERY AND RECESSION**

The international economic indicator system consists of groups of leading, coincident, and lagging indicators covering a wide variety of economic processes that have been found to be important in business cycles. The leading indicators are for the most part measures of anticipations or new commitments. They have a "look-ahead" quality and are highly sensitive to changes in the economic climate as perceived in the marketplace. The coincident indicators are comprehensive measures of economic performance: real GNP, industrial production, employment, unemployment, income, and trade. They are the

measures to which everyone looks to determine whether a nation is prosperous or depressed. The lagging indicators are more sluggish in their reactions to the economic climate, but they serve a useful purpose by smoothing out and confirming changes in trend that are first reflected in the leading and coincident indicators. Moreover, their very sluggishness can be an asset in cyclical analysis, because when they do begin to move, or when they move rapidly, they may show that excesses or imbalances in the economy are developing or subsiding. Hence the lagging indicators can (and often do) provide the earliest warnings of all, as when rapid increases in costs of production outstrip price increases and threaten profit margins, thus inhibiting new commitments to invest, which are among the leading indicators.

A conspectus of the U.S. indicators arranged according to the type of economic process they represent and the cyclical timing they exhibit is in Table 6-1. The compilation for other industrial countries is designed to represent substantially the same processes arranged in a similar manner. The degree of success in accomplishing this varies from one country to another, as shown in Table 6-2.

The attempt to duplicate the U.S. system abroad does not mean that all countries are thought to be alike or that other indicators could not be found that would serve equally well or better. Duplicating the U.S. system is not an ultimate goal but merely a practicable interim target. The U.S. indicator system has the advantage of being familiar to many users, and both its empirical properties and the economic logic on which it was based have been thoroughly investigated by many scholars over a long period.<sup>1</sup> This logic seems applicable to many countries where free enterprise prevails. Orders placed for machinery that is made to order are likely to lead machinery production in any market-oriented economy and are likely also to lead the production of the goods the machinery helps to produce. Similarly, in any enterprise economy, changes in the relations between prices and costs influence incentives to expand future output and to make capital investments. In countries where there are markets for common stock, stock prices can be expected to be especially sensitive to changes in profit prospects as well as to changes in interest rates, and hence to anticipate the effects of these changes on output, investment, and employment.

The selection of the U.S. indicator list as a target also advances the objective of providing sets of indicators as comparable as possible across countries. Unless some attention is paid to this, comparisons of cyclical movements in different countries are likely to become hopelessly confused. To cite one example, the index of leading indicators published by the British Central Statistical Office includes a

series on interest rates treated invertedly—that is, a rise in rates is counted as a depressing factor, and vice versa. This is not an unreasonable position to take, but in the U.S. classification interest rates are treated on a positive basis and are included among the lagging indicators (see Table 6-1). It is recognized that at times a rapid rise in such indicators can be interpreted as an adverse development. A straightforward comparison of the U.S. and U.K. leading indexes as published in each country would run afoul of this difference in procedure.

Nevertheless, it is obvious that the system should not be held in a straitjacket, and that adaptations to the way business is done in each country and to the particular statistical data available should be made as more experience with the system accumulates and additional research is conducted. Perhaps two systems will evolve, one in which international comparability is strictly maintained, and one in which each country's own data and cyclical response mechanisms are used to best advantage—always avoiding, as far as possible, arbitrary differences in methodology.

The acid test of the plan to assemble comparable sets of indicators for each country according to the U.S. system lies in whether such data behave in the way U.S. experience has led one to expect. To perform this test long-run trends were fitted to each indicator, including those for the United States, cyclical turning points in the deviations from trend were identified, a chronology of growth-cycle turns for each country was set up to represent the peaks and troughs in aggregate economic activity (after allowance for trend), and the leads and lags of each trend-adjusted indicator were measured with respect to these growth-cycle turns. The trend-adjustment procedure, although subject to difficulties of its own, was essential to the identification of cyclical movements in countries that had experienced almost continuous rapid growth through the period from 1948 to 1973. Computer programs, carefully monitored to rule out dubious results, helped to enhance the objectivity of the data processing. A summary of the findings on cyclical timing based on composite indexes constructed from each group of indicators, is given in Table 6-3.

The leading indexes constructed from indicators corresponding to those classified as leading on the basis of U.S. data, lead as a rule in each of the other countries except France. The coincident indexes, of course, show virtually no lead or lag, because they and their components are used to determine the growth-cycle chronologies themselves. The lagging indexes lag. Significantly, because the grouping of the indicators is based on U.S. experience only and not on experi-

Table 6-1. Cross-classification of U. S. Indicators by Economic Process and Cyclical Timing.

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

Notes to Table 6 - 1

<sup>a</sup> In constant prices.

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



Table 6-2. A Classification and List of International Economic Indicators.

	United States	Canada	France
<b>Leading</b>			
1.0	Average workweek, manufacturing	Average workweek, manufacturing	Average workweek, manufacturing
2.0	New unemployment claims <sup>a</sup>	New unemployment claims <sup>a</sup>	New unemployment claims <sup>a</sup>
3.0	New orders, consumer goods <sup>b</sup>	New orders, durable goods <sup>b</sup>	Change in unfilled orders <sup>c</sup>
4.0	Formation of business enterprises	n.a.	n.a.
5.0	Contracts and orders, plant and equipment <sup>b</sup>	5.1 New orders, equipment <sup>b</sup>	
6.0	Building permits, housing	5.2 Nonresidential building permits <sup>b</sup>	n.a.
7.0	Change in business inventories <sup>b</sup>	6.0 Residential building permits	6.0 Residential building permits
8.0	Industrial materials prices	7.0 Change in business inventories <sup>b</sup>	7.0 Change in stocks <sup>b</sup>
9.0	Stock price index	8.0 Industrial materials prices	8.0 Raw materials prices
10.0	Profits <sup>b</sup>	9.0 Stock price index	9.0 Stock price index
11.0	Ratio, price to labor cost	10.0 Profits <sup>b</sup>	n.a.
12.0	Change in consumer debt <sup>b</sup>	11.0 Ratio, price to labor cost	11.0 Ratio, price to labor cost
		12.0 Change in consumer debt <sup>b</sup>	n.a.
<b>Coincident</b>			
13.0	Nonfarm employment	13.0 Nonfarm employment	13.0 Nonfarm employment
14.0	Unemployment rate <sup>a</sup>	14.0 Unemployment rate <sup>a</sup>	14.1 Registered unemployed, number <sup>a</sup>
15.0	Gross national product <sup>b</sup>	15.0 Gross national expenditures <sup>b</sup>	15.0 Gross domestic production <sup>b</sup>
16.0	Industrial production	16.0 Industrial production	16.0 Industrial production
17.0	Personal income <sup>b</sup>	17.0 Personal income <sup>b</sup>	n.a.
18.0	Manufacturing and trade sales <sup>b</sup>	18.1 Retail trade <sup>b</sup>	18.1 Retail sales <sup>b</sup>
<b>Lagging</b>			
19.0	Long-duration unemployment <sup>a</sup>	19.0 Long-duration unemployment <sup>a</sup>	19.0 Long-duration unemployment <sup>a</sup>
20.0	Plant and equipment investment <sup>b</sup>	20.0 Plant and equipment investment <sup>b</sup>	20.0 Plant and equipment investment <sup>b</sup>
21.0	Business inventories <sup>b</sup>	21.0 Business inventories <sup>b</sup>	21.0 Business inventories <sup>b</sup>
22.0	Productivity change, nonfarm <sup>a</sup>	22.1 Productivity change, manufacturing <sup>a</sup>	22.0 Productivity change, nonfarm <sup>a</sup>
23.0	Business loans outstanding <sup>b</sup>	23.0 Business loans outstanding <sup>b</sup>	23.0 Business loans outstanding <sup>b</sup>
24.0	Interest rates, business loans	24.0 Interest rates, business loans	24.0 Interest rates, business loans

## West Germany

## United Kingdom

## United States

## Leading

- |  |   |  |
|--|---|--|
| 1.0 Average workweek, manufacturing                        | 1.0 Average workweek, manufacturing               | 1.1 Short-hour workers <sup>a</sup>              |
| 2.0 New unemployment claims <sup>a</sup>                   | n.a.  | 2.0 Unemployment applicants <sup>a</sup>         |
| 3.0 New orders, consumer goods <sup>b</sup>                | n.a.  | n.a.   |
| 4.0 Formation of business enterprises                      | 4.1 New companies registered                      | 4.1 Insolvent enterprises <sup>a</sup>           |
| 5.0 Contracts and orders, plant and equipment <sup>b</sup> | 4.2 Business failures                             | 5.1 New orders, investment goods <sup>b</sup>    |
| 6.0 Building permits, housing                              | 5.1 New orders, engineering industry <sup>b</sup> | 6.1 Residential construction orders <sup>b</sup> |
| 7.0 Change in business inventories <sup>b</sup>            | 5.2 New orders, construction <sup>b</sup>         | 7.0 Inventory change <sup>b</sup>                |
| 8.0 Industrial materials prices                            | 6.0 Housing starts                                | 8.0 Basic material prices <sup>d</sup>           |
| 9.0 Stock price index                                      | 7.0 Change in stocks <sup>b</sup>                 | 9.0 Stock price index                            |
| 10.0 Profits <sup>b</sup>                                  | 8.0 Basic materials prices                        | 10.1 Income from enterprise <sup>b</sup>         |
| 11.0 Ratio, price to labor cost                            | 9.0 Stock price index                             | 11.0 Ratio, price to labor cost                  |
| 12.0 Change in consumer debt <sup>b</sup>                  | 10.0 Profits <sup>b</sup>                         | 12.0 Change in consumer debt <sup>b</sup>        |
|  | 11.0 Ratio, price to labor cost                   |  |
|  | 12.0 Increase in hire purchase debt <sup>b</sup>  |  |

## Coincident

- |   |   |  |
|---|---|--|
| 13.0 Nonfarm employment                         | 13.0 Employment, industry                       | 13.1 Employment, mining and manufacturing      |
| 14.0 Unemployment rate <sup>a</sup>             | 14.0 Registered unemployed, number <sup>a</sup> | 14.0 Registered unemployment rate <sup>a</sup> |
| 15.0 Gross national product <sup>b</sup>        | 15.0 Gross domestic product <sup>b</sup>        | 15.0 Gross national product <sup>b</sup>       |
| 16.0 Industrial production                      | 16.0 Industrial production                      | 16.0 Industrial production                     |
| 17.0 Personal income <sup>b</sup>               | 17.0 Personal income <sup>b</sup>               | 17.0 Disposable income <sup>b</sup>            |
| 18.0 Manufacturing and trade sales <sup>b</sup> | 18.1 Retail sales <sup>b</sup>                  | 18.1 Manufacturing sales <sup>b</sup>          |
|   |   | 18.2 Retail trade <sup>b</sup>                 |

## Lagging

- |  |   |   |
|--|---|---|
| 19.0 Long-duration unemployment <sup>a</sup>     | 19.0 Long-duration unemployment <sup>a</sup>                    | n.a.  |
| 20.0 Plant and equipment investment <sup>b</sup> | 20.0 Plant and equipment expenditure <sup>b</sup>               | 20.0 Plant and equipment expenditure <sup>b</sup> |
| 21.0 Business inventories <sup>b</sup>           | 21.0 Business inventories <sup>b</sup>                          | 21.0 Business inventories <sup>b</sup>            |
| 22.0 Productivity change, nonfarm <sup>a</sup>   | 22.0 Productivity change, industry <sup>a</sup>                 | 22.1 Productivity change, industry <sup>a</sup>   |
| 23.0 Business loans outstanding <sup>b</sup>     | 23.1 Industrial and agricultural loans outstanding <sup>b</sup> | 23.1 Bank loans outstanding <sup>b</sup>          |
| 24.0 Interest rates, business loans              | 24.0 Interest rates, business loans                             | 24.1 Interest rates, large loans                  |

(Table 6-2. continued overleaf)

Table 6-2. continued

	<i>United States</i>	<i>Italy</i>	<i>Japan</i>
<b>Leading</b>			
1.0 Average workweek, manufacturing		1.1 Monthly hours, industry	1.1 Overtime worked, manufacturing
2.0 New unemployment claims <sup>a</sup>		n.a.	n.a.
3.0 New orders, consumer goods <sup>b</sup>		3.1 Change in unfilled orders <sup>c</sup>	n.a.
4.0 Formation of business enterprises		4.1 Declared bankruptcies <sup>a</sup>	4.1 Business failures <sup>a</sup>
5.0 Contracts and orders, plant and equipment <sup>b</sup>		n.a.	5.0 New orders, machinery and construction <sup>b</sup>
6.0 Building permits, housing		6.0 Residential building permits	6.1 Dwelling units started
7.0 Change in business inventories <sup>b</sup>		n.a.	7.0 Change in inventories <sup>b</sup>
8.0 Industrial materials prices		n.a.	8.0 Raw materials prices
9.0 Stock price index		9.0 Stock price index	9.0 Stock price index
10.0 Profits <sup>b</sup>		n.a.	10.0 Profits <sup>b</sup>
11.0 Ratio, price to labor cost		11.0 Ratio, price to labor cost	11.0 Ratio, price to labor cost
12.0 Change in consumer debt <sup>b</sup>		n.a.	12.1 Change in consumer and housing debt <sup>b</sup>
<b>Coincident</b>			
13.0 Nonfarm employment		13.0 Nonfarm employment	13.0 Nonfarm employment, regular workers
14.0 Unemployment rate <sup>a</sup>		14.0 Unemployment rate <sup>a</sup>	14.0 Unemployment rate <sup>a</sup>
15.0 Gross national product <sup>b</sup>		15.0 Gross domestic product <sup>b</sup>	15.0 Gross national expenditures <sup>b</sup>
16.0 Industrial production		16.0 Industrial production	16.0 Industrial production
17.0 Personal income <sup>b</sup>		n.a.	17.1 Wage and salary income <sup>b</sup>
18.0 Manufacturing and trade sales <sup>b</sup>		18.1 Retail sales <sup>b</sup>	18.1 Retail sales <sup>b</sup>
<b>Lagging</b>			
19.0 Long-duration unemployment <sup>a</sup>		n.a.	n.a.
20.0 Plant and equipment investment <sup>b</sup>		20.1 Plant and equipment expenditures <sup>b</sup>	20.0 Plant and equipment expenditure <sup>b</sup>
21.0 Business inventories <sup>b</sup>		21.0 Business inventories <sup>b</sup>	21.0 Business inventories <sup>b</sup>
22.0 Productivity change, nonfarm <sup>a</sup>		n.a.	22.1 Productivity change, industry <sup>a</sup>
23.0 Business loans outstanding <sup>b</sup>		n.a.	23.1 Total loans outstanding <sup>b</sup>
24.0 Interest rates, business loans		24.0 Interest rates, business loans	24.1 Interest rates, business loans

**Notes to Table 6-2**

<sup>a</sup> Treated invertedly in the composite indexes.

<sup>b</sup> In constant prices.

<sup>c</sup> Change in net balance of survey responses.

<sup>d</sup> Not included in leading index for West Germany.

*Note:* Series numbers are based on the U. S. list. The digits after the decimal indicate whether the series is substantially the same as the U. S. series (0), or only roughly equivalent (1 or 2).

*Source:* Center for International Business Cycle Research, Rutgers University.

Table 6-3. Cyclical Timing of Economic Indicators during Growth Cycles, Seven Countries.

	Median Lead (-) or Lag (+), in Months							Averages:		
	United States 1948- 1981	Canada 1948- 1981	United Kingdom 1952- 1981	West Germany 1950- 1981	France 1951- 1981	Italy 1956- 1977	Japan 1953- 1975	Six Countries Except U.S.	Seven Countries	
At growth-cycle peaks										
Lagging index, inverted	-15	-13	-24	-12	-12	-14	-14	-15	-15	
Leading index	-2	-2	-10	-7	0	-9	-4	-5	-5	
Coincident index	+1	0	0	0	+2	0	-1	0	0	
Lagging index	+5	+5	+7	+2	+2	+2	+8	+5	+5	
At growth-cycle troughs										
Lagging index, inverted	-11	-16	-19	-18	-16	-7	-14	-15	-14	
Leading index	-2	-4	-9	-2	0	-6	-5	-4	-4	
Coincident index	0	0	0	0	0	+3	0	0	0	
Lagging index	+6	+4	+8	+4	+5	+10	+8	+6	+6	

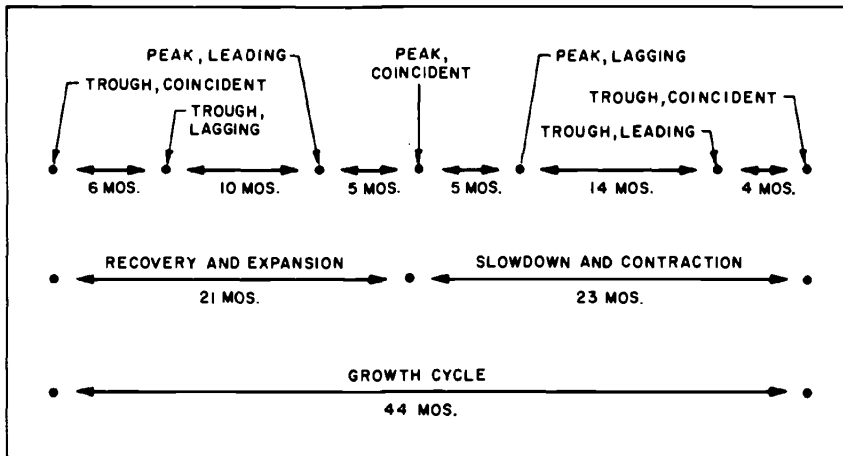
Source: Center for International Business Cycle Research, Rutgers University.

ence in the country itself, the sequence of turns among the leading, coincident, and lagging groups in each country corresponds roughly to the sequence in the United States. The detailed results show that this sequence has been repeated at virtually every turn in each country. Moreover, this consistency includes the tendency for the turns in the lagging indexes to precede opposite turns in the leading indexes, corresponding to the economic logic noted previously (compare the top line with the second line in each panel of the table). The sequences do not appear to differ systematically from one country to another; hence it is appropriate to average them (see the last two columns of the table). The average sequence is set forth schematically in Figure 6-1. Since the growth-cycle chronologies and the recorded leads and lags are based on trend-adjusted data, the rising and falling phases are roughly symmetrical, as are the intervals into which they are subdivided by the turns in the indexes.

Nevertheless, it is true that there are wide variations in the lengths of lead or lag from one cycle to another or from one indicator to another. The system is neither simple nor mechanical. But the historical record is available to help guide current interpretations, and it appears to support the basic hypothesis underlying the scheme, namely, that the U.S. indicator system is broadly applicable overseas.

The composite indexes referred to in Table 6-3 have been computed using a method employed for some years by the U.S. Depart-

Figure 6-1. Average Sequence of Cyclical Turns in Three Composite Indexes during Growth Cycles, Seven Countries.



Source: Table 6-3.

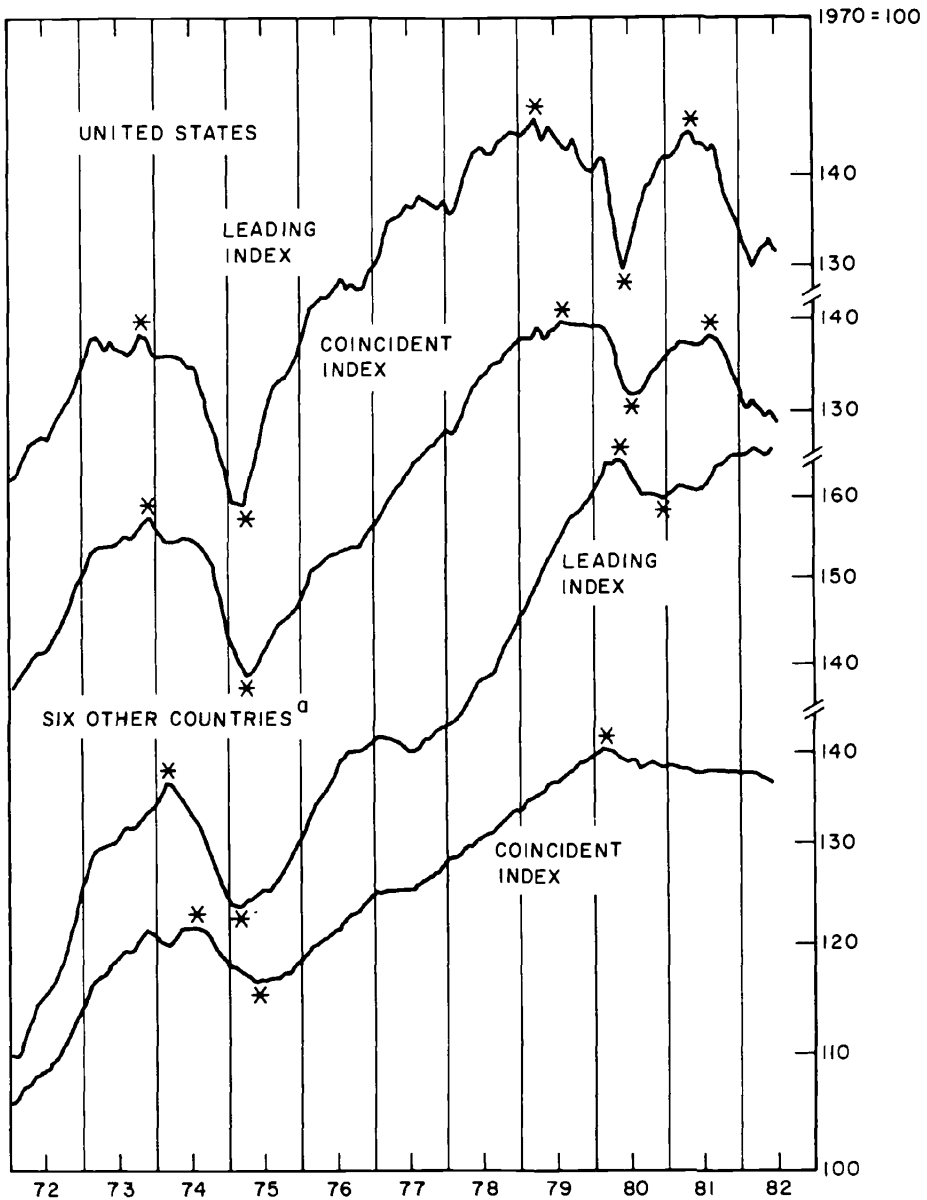
ment of Commerce. The indexes are constructed so that their trend rate of growth during 1966-1976 is equal to that of real GNP for the country concerned during the same period. The procedure corrects for the rather haphazard long-run trends that are likely to result from combinations of indicators that, despite efforts to obtain comparability, are not precisely the same in the several countries. In addition to the indexes with trend equal to the trend in GNP, indexes are available with the long-run trend eliminated. These depict the growth cycles discussed previously. The trend rates of growth in the individual indicators are of interest in themselves for the purposes of analyzing each country's long-run rate of growth.<sup>2</sup> Finally, short-run rates of growth in the indexes have been compiled, based on changes over successive intervals of six months or twelve months. These rates also depict the growth cycles, but they do not depend upon any trend-fitting procedure and hence avoid the uncertainty that is inevitably attached to bringing such trends up to date.

Although the procedure ensures that the long-run trend in the indexes will be approximately the same as the trend in real GNP, the fluctuations in the indexes are larger than those in GNP, partly because most of the components are more sensitive than GNP, partly because most of them are monthly rather than quarterly. Another reason is that the average month-to-month change (without regard to sign) in each country's industrial production index is used as a standard by which to adjust the month-to-month change in the index, and industrial production usually undergoes wider swings than GNP. The indexes thus provide measures of economic performance based not on a single indicator but on a group of significant indicators that are relatively homogeneous with respect to cyclical timing. As a consequence of both the cyclical homogeneity and the variety of economic data included, the indexes are relatively free of the month-to-month irregularities that beset most economic time series.

Figure 6-2 compares the leading and coincident indexes for the United States and for six other countries combined (Canada, United Kingdom, West Germany, France, Italy, and Japan) during 1972-1982. In the combined index each country's index is weighted by the country's GNP in 1970 (expressed in U.S. dollars). Figure 6-3 shows the growth rates for the same indexes.<sup>3</sup> Both charts demonstrate the capacity of the leading indexes to keep a few months ahead of the broad measures of economic performance contained in the coincident indexes.

Another illustration of the kind of sequence that can be expected by monitoring the leading and the coincident indicators, covering a longer historical period, may be found in Figure 6-4. Here the

Figure 6-2. Leading and Coincident Indexes, United States and Six Other Countries, 1972-1982.



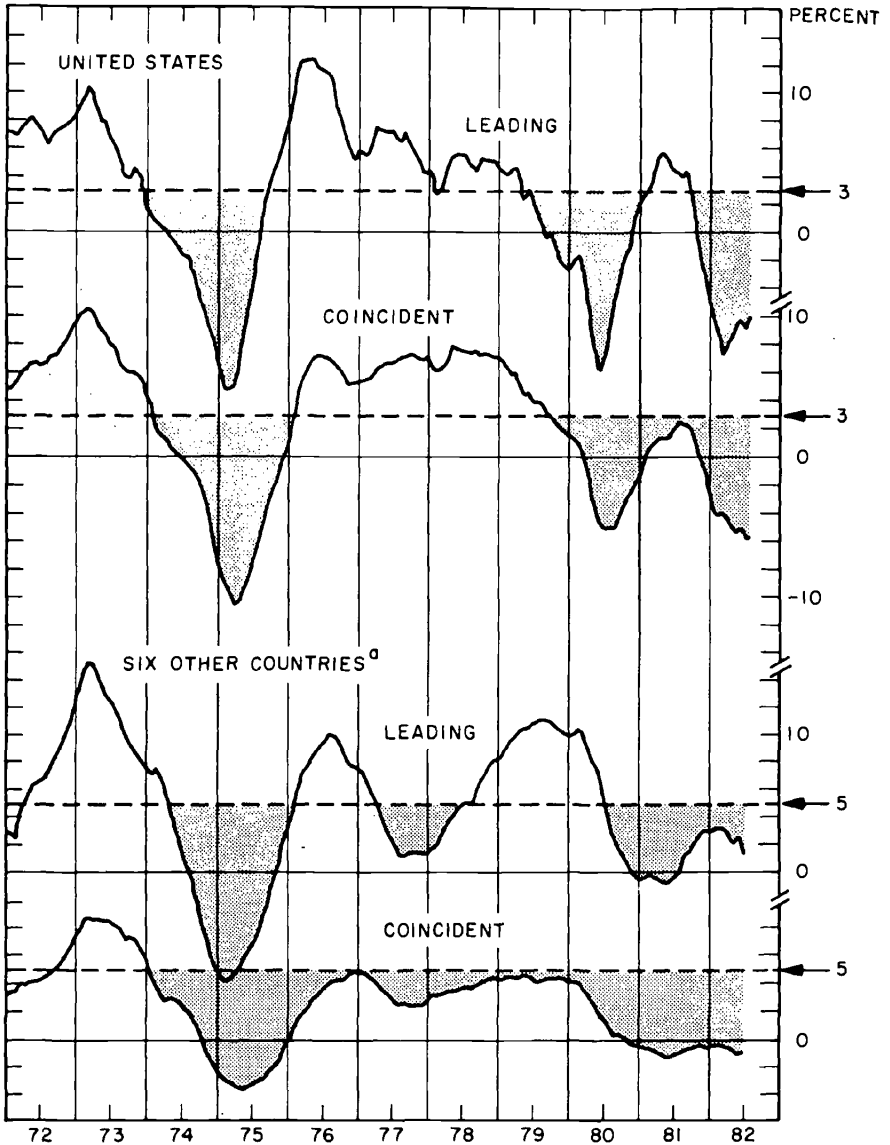
\* Specific cycle peak or trough.

<sup>a</sup> Canada, United Kingdom, West Germany, France, Italy, Japan.

Source: Center for International Business Cycle Research, Rutgers University.



**Figure 6-3.** Growth Rates in Leading and Coincident Indexes, United States and Six Other Countries, 1972-1982 (Twelve-Month Smoothed Percentage Change).

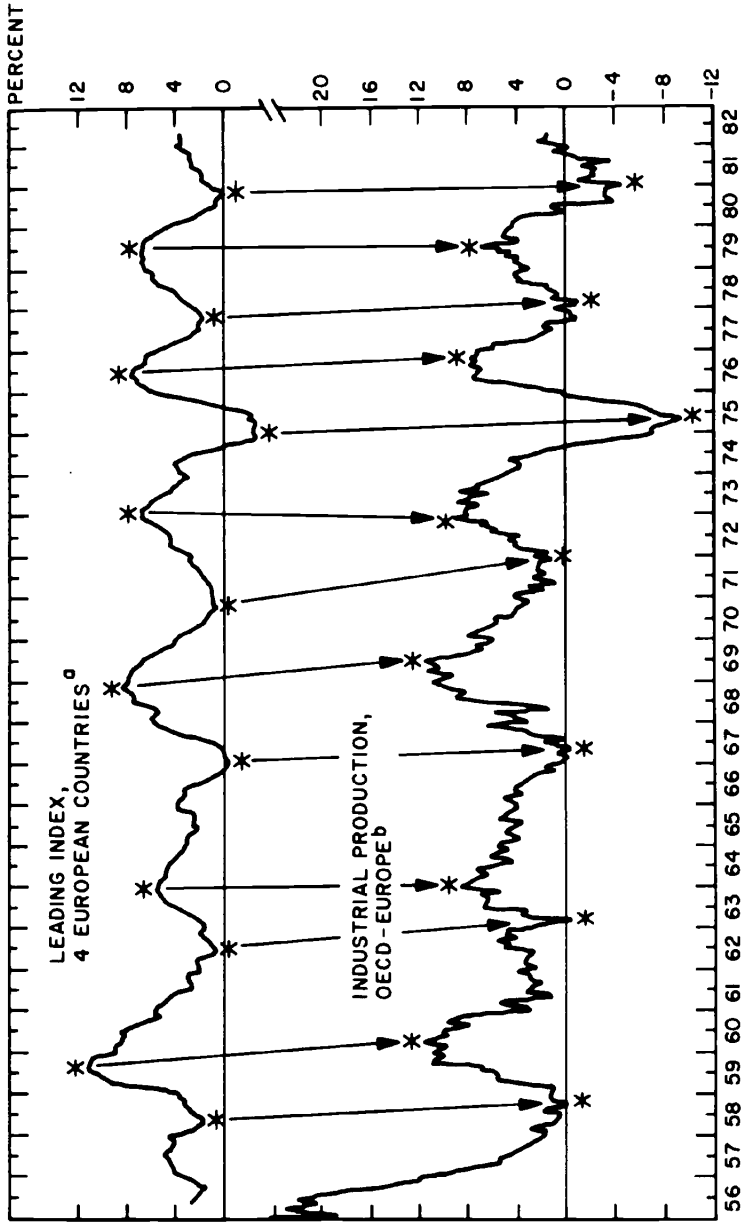


Note: Arrows indicate rate of change, 1966-1976, in the indexes and in real GNP.

<sup>a</sup>Canada, United Kingdom, West Germany, France, Italy, Japan.

Source: Center for International Business Cycle Research, Rutgers University.

Figure 6-4. Growth Rates in Leading Index and in Industrial Production, Western Europe, 1956-1982 (Twelve-month smoothed percentage change).



<sup>a</sup> United Kingdom, West Germany, France, Italy.

<sup>b</sup> Includes in addition to the above four countries: Austria, Belgium, Finland, Greece, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland.

Sources: Leading Index, Center for International Business Cycle Research; Industrial Production Index, Organization for Economic Cooperation and Development.

Table 6-4. Leading Indexes and Industrial Production, Seven Countries (Leads and Lags at Turning Points in Rates of Change).

	Period Covered	Number of			Total	Average Lead (-) or Lag (+), in Months
		Leads	Coincidence	Lags		
United States	1958-1979	10	2	0	12	-3
Canada	1958-1979	6	3	2	11	-1
United Kingdom	1957-1979	5	3	3	11	-4
West Germany	1959-1979	8	—	2	10	-4
France	1959-1979	7	1	5	13	-3
Italy	1958-1979	9	1	1	11	-4
Japan	1958-1979	10	2	1	13	-2
Total, seven countries		55	12	14	81	-3
Composite indexes: Western Europe <sup>a</sup>	1956-1979	9	1	1	11	-4
Six countries <sup>b</sup> excluding United States	1972-1979	4	0	0	4	-2

Note: The rates of change in both the leading and industrial production indexes are percentage changes over twelve months, smoothed, as explained in the text.

<sup>a</sup>The leading index, compiled by the Center, includes the United Kingdom, West Germany, France and Italy, weighted by their real GNP, in U.S. dollars, in 1970. The industrial production index, compiled by OECD, includes the above four countries plus Austria, Belgium, Luxembourg, Finland, Greece, Ireland, The Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland, weighted by gross domestic product originating in industry.

<sup>b</sup>Canada, United Kingdom, West Germany, France, Italy, Japan. In the leading index, compiled by the Center, the countries are weighted by their real GNP, in U.S. dollars, in 1970. In the industrial production index, compiled by the U.S. Department of Commerce, the countries are weighted by gross domestic product originating in industry, in U.S. dollars, in 1975.

Source: Center for International Business Cycle Research, Rutgers University.

growth rates in the composite leading index for four European countries are compared with the industrial production index for OECD Europe. Industrial production is one of the most widely used economic indicators around the world, and it is one of the components of our coincident indexes. Many countries do not have quarterly estimates of gross national product but do have monthly figures on industrial production. Covering manufacturing and mining and often including utilities and construction activity, the index pertains to a sector of the economy that is highly sensitive to business cycles.

For all these reasons it is important to watch the industrial production index, and to contemplate where it is going next. Here is where the leading indexes can be helpful. The comparison in Figure 6-4 reveals that the swings in the growth of industrial production in Europe correspond to those in our leading index with considerable fidelity. Detailed study shows this to be true also of the data for each country. Furthermore, the turns in the leading index growth rates usually precede those in industrial production and are easier to recognize because the leading indexes are smoother and less influenced by erratic movements. As Table 6-4 shows, leads outnumber lags by nearly four to one. The average lead time for all seven countries covered by the table is three months.

The economic basis for this relationship is that the components of the leading index represent actions of an anticipatory nature that are especially sensitive to changes in cost and profit prospects and the state of demand. New orders for equipment, contracts placed for construction work, and housing starts are obvious examples. The length of the average workweek is one of the first adjustments made when manufacturers detect a shift in demand and reduce or increase overtime work or the number of part-time employees. By combining a dozen or so of such measures into a single index, the idiosyncrasies of any single one of them are muted, and the result is a leading index possessing the properties described. These properties do not make it an infallible instrument for appraising the outlook in any country. But when a businessman judges the future of his company, he does not regard the current state of his orderbooks as an infallible guide either. That does not stop him from wanting to know what state they are in. It is the same with the leading indexes. They reflect actions that are likely to affect production a few months hence, and consequently are useful guides to the state of the market.

## **RECESSION-RECOVERY PATTERNS**

Once an historical chronology of business cycles or growth cycles has been established and a collection of indicators assembled, it becomes

possible to compare the current behavior of the indicators with their patterns of change during the corresponding stages of previous cycles. Although no two business cycles are exactly alike, there are family resemblances, and they can be employed systematically to evaluate the current situation and glimpse what lies ahead.

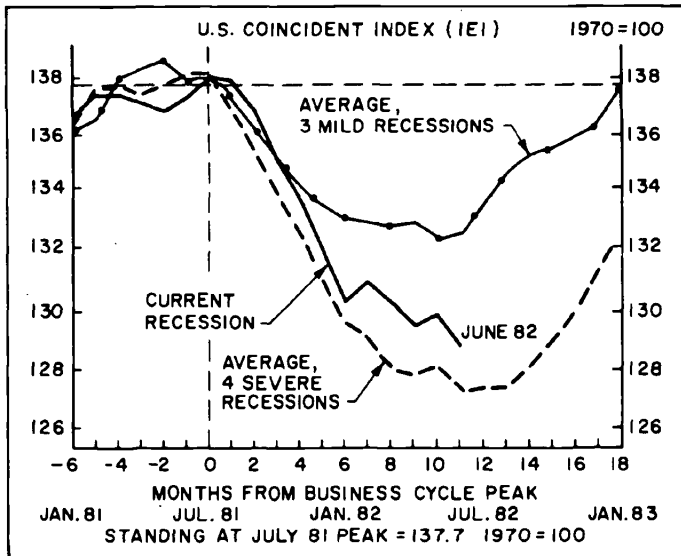
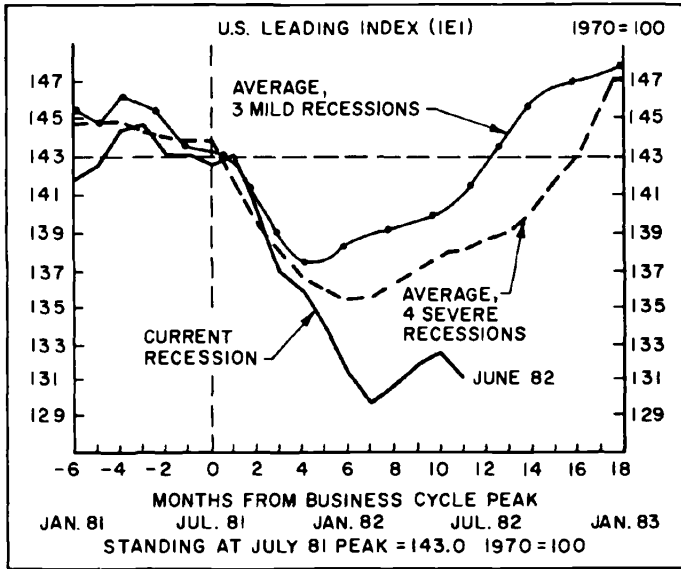
Methods of making such comparisons have been employed for many years in the United States. The Commerce Department's *Business Conditions Digest* regularly carries charts of this type, and the Rutgers Center for International Business Cycle Research issues periodic reports utilizing the technique.<sup>4</sup> The comparisons help one to anticipate what is typical business cycle performance and to observe whether current performance is in line with it or not. Although every business cycle has its own surprises, partly because of policy actions taken, many developments are not surprising, having occurred many times before. Hence a look at what has happened during the later stages of past business cycles is also a look ahead.

An example of how this works in practice is provided by Figure 6-5. The behavior of the U.S. leading and coincident indexes during the recession that started from the business cycle peak of July 1981 is compared with their average pattern during the seven preceding recessions. These seven can be divided into two groups: four recessions that were relatively sharp (1949, 1954, 1958, 1975) and three that were mild (1961, 1969, 1980). Such a chart gives one a quick grasp of how mild or severe a current recession is, how it compares in duration, whether the usual signs of recovery are developing, and so on.

## IMPLICATIONS FOR FOREIGN TRADE

The effect upon the economy of one country of a slowdown in economic growth in other countries is likely to be most visible in that country's exports. The volume of exports depends upon the trend of economic activity in the country to which the exports go. Ordinarily this is measured by gross national product or industrial production, both of which are among the coincident indicators. Since the leading indicators, as we have seen, usually anticipate the movement of the coincident by several months, the leading indexes for the trading partners may also anticipate the movements in exports to them. A number of tests of this hypothesis have been made, using the leading indexes to forecast the rate of change in the volume of trade to and from particular countries or groups of countries, and for trade as a whole as well as for various commodity groupings. The results of this research show that a substantial proportion of the year-to-year

Figure 6-5. Patterns of Current and Previous Recessions.



Note: The vertical line at zero represents business cycle peak dates. The current and previous business cycles are aligned so that their peaks fall on this line. The horizontal line represents the level of the data at business cycle peaks. The historical data are converted to indexes with their business-cycle peak levels equal to the current business cycle peak level.

changes in trade flows can usually be accounted for in this manner. Figure 6-6 displays the results of one such test, where the percentage rates of growth in U.S. exports to all countries, after allowance for changes in prices, are compared with the prior changes in an export-weighted leading index for the six countries outside the United States. Despite the fact that exports are affected by many other factors not explicitly taken account of in this simple model, the method tracks the major swings fairly well.

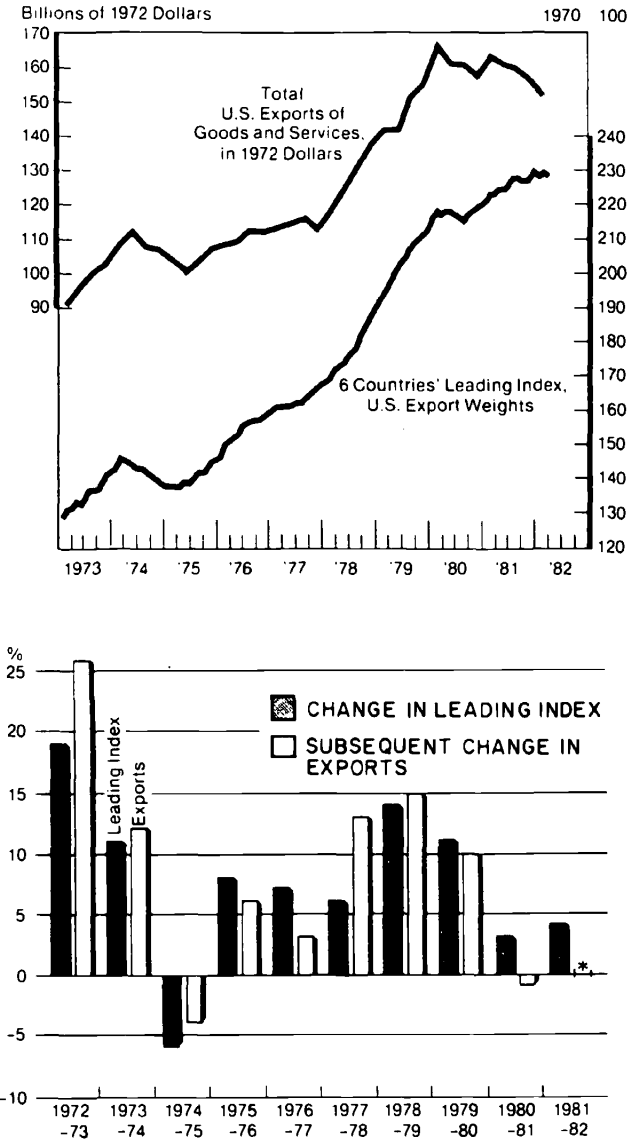
The same method can be employed to forecast the exports of any country, developed or developing, that trades with the industrial countries for which we have leading indexes. We have already obtained similar results for the exports of the United Kingdom, West Germany, Japan, and for a major group of developing countries. Naturally this method by itself has serious limitations, since it ignores other factors that influence the quantities of goods exported. Changes in exchange rates, tariffs and other barriers or incentives to trade, supply conditions, and pricing policies are taken into account only insofar as they affect the leading indicators for the importing countries. Yet, in view of the importance of trade flows and trade balances in the economic relations among nations, even a modest contribution to our economic intelligence in appraising trade prospects is worthwhile.

## IMPLICATIONS FOR INFLATION

Growth cycles are closely associated with the rate of inflation. Indeed, as far as U.S. experience is concerned, declines in the rate of inflation have been associated with virtually every slowdown or contraction in real economic growth and have not occurred at other times. Both parts of this proposition are important. Declines in the rate of inflation have not been as rare as is commonly believed, but they have occurred only at times of slower economic growth, never at times of rapid growth. The proposition appears to be true in other countries as well as in the United States.

The international indicator system is helpful in examining the evidence, and so is the concept of the growth cycle described earlier. This distinguishes periods of rapid growth from periods of slow growth by reference to a long-run trend. Trend-adjusted data rise as long as the short-run rate of growth exceeds the long-run rate. They decline as long as the short-run rate is less than the long-run rate. The peaks and troughs in trend-adjusted data, therefore, delineate periods of rapid and slow growth relative to the trend rate.

Figure 6-6. U.S. Exports and an Export-Oriented Leading Index.



\* Not available.

Note: For 1972-1973, the change in the leading index is based on the ratio of the December 1972 index to the average index during the preceding twelve months. The change in exports is based on totals for 1972 and 1973. Similar calculations are made for other years.

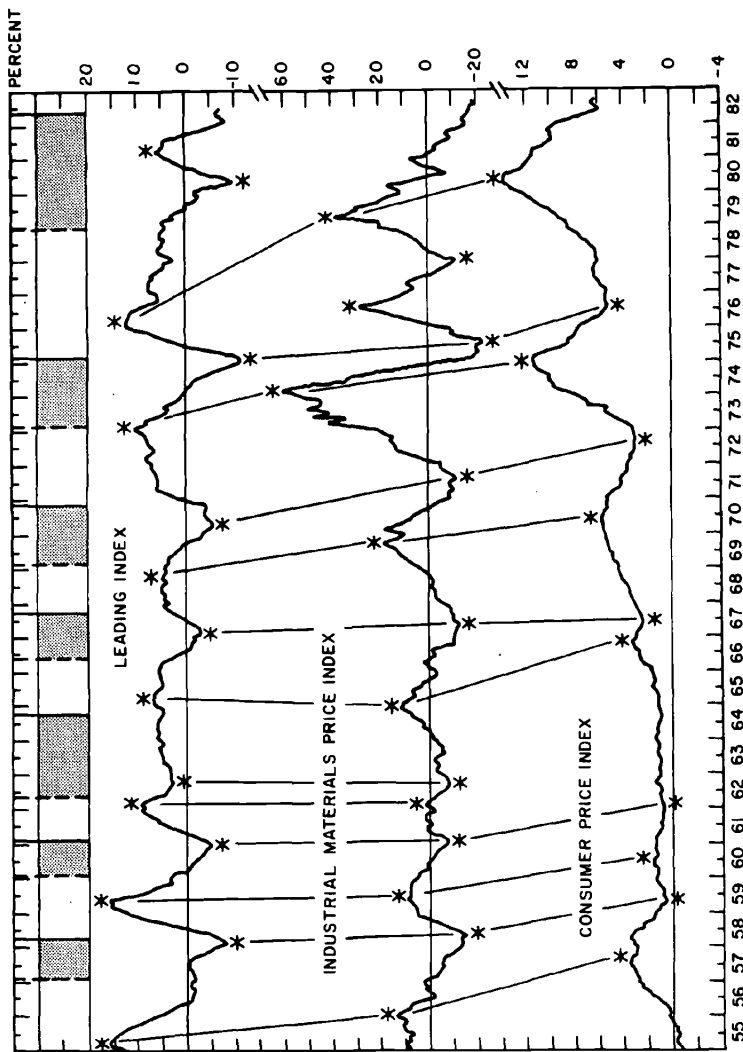


For the United States, a chronology of growth cycles based on trend-adjusted data for the physical volume of aggregate economic activity is used in Figure 6-7 as a backdrop against which to examine the movements in the rate of change in two price indexes. The index of industrial materials prices—that is, prices of metals, textiles, rubber, and the like—shows an especially close relation to the growth cycle. Downswings in the rate of change in these prices occurred in every period of slow growth or recession, and upswings occurred in every period of rapid growth. Often, as in 1956 and 1959, the downswings began before the onset of the slow-growth periods. This price index is one of the leading indicators in Table 6-1; here it leads not only the growth cycle but also the rate of change in the consumer price index (CPI), the bottom line in Figure 6-7. The CPI, which of course includes the prices of services as well as commodities, responds to the growth cycle as well, but often with a lag of a year or more. The lags have been so long, especially in recent years, that sometimes the rate of inflation in the CPI has risen almost throughout the period of slow growth or recession, giving the erroneous impression that slow growth had no influence on inflation.

Watching both price indexes together, and bearing in mind their differences in sensitivity and tendency to lag, enables one to see that growth cycles have pervasive influences upon the price structure. The change one sees in the consumer price index (as, for example, the decline in its rate of increase from autumn 1974 to spring 1976) is a lagged response to or reflection of similar developments in commodity markets that react far more promptly to changes in demand pressures or supply conditions.

Corresponding data and growth cycle chronologies for the six other countries covered in the international indicator system suggest that similar relations are to be found in these countries. Conditions that produce rates of economic growth greatly in excess of long-run trend are conducive to an acceleration of inflation, while conditions that make for slow growth or recession are conducive to a reduced rate of inflation or even to deflation. When ordering is brisk and order backlogs accumulate, sellers have opportunities and incentives to raise prices, and buyers are less averse to paying them. Costs of production tend to creep up, labor turnover increases, control over efficiency and waste tends to decline. New commitments for investment are made in an optimistic environment, building up demand for limited supplies of skilled labor and construction equipment. Credit to build inventories is more readily available and is in greater demand, even if higher interest rates must be paid for it, thereby raising costs. Labor unions see better opportunities to obtain favorable con-

Figure 6-7. Rates of Change in Leading Index and in Two Price Indexes during Growth Cycles, United States, 1955-1982  
 (Twelve-Month Smoothed Percentage Change).



Note: Shaded areas represent slowdowns in economic growth as determined from trend-adjusted measures of aggregate output, income, sales, and employment. Lines connect corresponding peaks and troughs in the rates of change in the three indexes.  
 Sources: Leading Index, Center for International Business Cycle Research, Rutgers University. Industrial Materials Price Index: 1948-1961, Department of Commerce, Bureau of Economic Analysis; 1962 on, Journal of Commerce. Consumer Price Index, U.S. Department of Labor, Bureau of Labor Statistics.

tract settlements, and their members are more willing to strike to get them. All these conditions apply to more and more firms and industries and produce upward pressure on more and more prices. Indeed, one of the principal factors underlying a rising rate of inflation in the general price level is not just that some prices rise in big jumps but that more prices rise at more frequent intervals.

During periods of slow growth or actual decline in aggregate economic activity, the opposite conditions prevail. Firms and industries cut back their output, reduce or eliminate overtime, shave costs, give bigger discounts off list prices, reduce inventories, repay bank debt, and postpone new investment projects or stretch out existing ones. Quit rates decline, indicating that workers feel they must hang on to their jobs, and labor demands for pay raises become more conservative. Interest rates drop. As price increases become less widespread and less frequent, and as more price cutting takes place, the rate of inflation declines.

Since many of the processes sketched here are represented among the leading and lagging indicators, they can also be employed to monitor inflation, evaluate its twists and turns, and judge its prospects. We hope, therefore, that this potential use for the indicators presented will not be overlooked.

## FURTHER RESEARCH AND DEVELOPMENT

A continuing research and development program is essential if the system of international economic indicators described is to be used effectively and improved. As already noted, the Rutgers Center for International Business Cycle Research is conducting such a program. Coverage of the indicator system has already been extended to many additional countries, including Sweden, the Netherlands, Belgium, Switzerland, Australia, South Korea, and Taiwan. Attention is being given to speedier access to data, new types of graphic displays, and other analytical tools. Methods of trend-adjusting current data are being tested, as well as methods of defining early warning signals of recession and recovery. Detecting an international recession promptly and measuring its scope and severity, appraising trade prospects, and getting early warning signals of new inflationary trends are matters of vast consequence to the peoples of the world. If the contents of this book contributes to these tasks, it will have served its end.

## NOTES TO CHAPTER 6

1. For a list of NBER publications that explain the behavior of and relationships among particular indicators, see Chapter 21.

2. The method of trend-fitting is described in Charlotte Boschan and Walter Ebanks, "The Phase-Average Trend: A New Way of Measuring Economic Growth," In *Proceedings of the Business and Economics Statistics Section*, American Statistical Association, 1978.

3. The growth rates are calculated by taking the ratio of the current month's index to the average index for the twelve months ending six months ago. This method produces a rate of growth (or decline) that is similar to but smoother than, the percentage change in the index from the same month a year ago. The twelve-month average smooths away erratic factors, such as a strike or unusual weather, that may have affected the year-ago figure. The method does not, of course, smooth out any erratic influences affecting the current month. An alternative method is to take the ratio of the current month's index to the average of the twelve immediately preceding months, and express the result at an annual rate. This gives a more up-to-date estimate of the growth rate than the one shown in Figure 6-3, but also is more affected by erratic movements in the current month.

4. *Recession-Recovery Watch* has been a bimonthly publication of the Center since 1979.

