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Business Cycle Indicators: How to Read the Economic Signposts

by Deborah J. Brown, Assistant Professor of Agricultural Economics

You open the morning paper. The paper says the money supply (M 1, 1972 dollars) is up, employment in durable goods is down and the deflated GNP hasn't budged this quarter. What's happening? Are we heading out of a recession or into one?

Indiana, as a state with a higher than average percentage of its personal income coming from durable goods manufacturers, is harder hit than average during business cycle downswings. This circular will describe some of the economic signposts that professional economists and statisticians use to determine when a recession is about to hit, when the cycle has hit bottom, and when the economy is about to turn up. Watching these signposts won't give you perfect economic foresight; but, it should improve your ability to read the economic climate around you.

Available Data Series

The National Bureau of Economic Research decides when a recession has occurred. Usually a major element of their definition of a recession is

two consecutive quarters of a year during which the Gross National Product (GNP) fell. The Gross National Product (GNP) is a measure of all goods and services which we as a country produce. The major components of the GNP are: personal consumption expenditures (washing machines, groceries, doctor bills); gross private investment (factories, metal presses, apartment houses, changes in business inventories); net exports (goods, services, and capital exported out of the United States minus goods and services imported into the United States); and government purchases of goods and services. Drops in the GNP are accompanied by changes in money income, employment, production, sales, capital investment, inventories, and credit.

Universities and government agencies have data on a large number of such variables going back to at least 1947. For example, data is available on personal income, industrial production, new orders for durable goods, sales of retail stores, consumer installment debt, change in business inventories, corporate net cash flow, net change in mortgage debt, and so on. Statistics which are available for several years or more are called **data series**. For example, the GNP is

available for every year and quarter since before World War II.

There is an abundance of economic data series. It would be nice to pick out of all this data a few series which persistently move down before the general economy and other series which persistently move up before the general economy. It also would be nice to have data series which moved at exactly the same time as the general economy, so that one would know when a recession or boom had begun.

The U.S. Department of Commerce's Bureau of Economic Research (BER) has studied a large number of individual data series to determine how they have performed between 1947 and 1977. They classified 150 series which conformed well to business cycle movement in this period as "Cyclical Indicators." They classified 140 other series as "Other Important Economic Measures." These 140 series are valuable to forecasters, but don't conform closely enough to business cycle movements to classify as cyclical indicators. All these series are reported monthly in the **Business Conditions Digest**, and are probably referred to frequently in your newspaper.

Coincident, Leading and Lagging Cyclical Indicators

The BER classifies cyclical indicators according to whether they typically have led, lagged, or moved concurrently with the general economy's business cycle **peaks** and **troughs**. The **peak** of a cycle is the end of the expansion and the beginning of a recession. The **trough** of a cycle is the end of a recession and the beginning of an expansion.

Because a business cycle is generally defined as changes in the output of a large number of goods and services, data series which measure changes in aggregate output — such as industrial production, construction work, and employment — are apt to move concurrently with the business cycle. Series which precede a peak by as little as three months or follow it by as little as one month are termed **coincident indicators**. Series which lead a trough by as little as one month or which follow it by as little as three months are also termed **coincident indicators**.

Other indicators, such as orders for new plants and equipment and building contracts, tend to move before the coincident indicators, and so are called **leading indicators**. They tend to hit their highs some months before the general business cycle peaks or to hit their lows some months before the lowest point in the general business cycle. One indicator which generally leads both peak and troughs, for example, is the "Average Workweek of Production Workers in Manufacturing." This is because businesses tend to reduce their employees' hours in a downturn before they fire anyone, and tend to pay overtime in an upswing before they hire anyone new.

On the other side of coincident indicators are data series which tend to lag behind the general cyclical movements. These are called **lagging indicators**. "Inventories" and "Short-Term Bank Loans to Business" (which are used mainly to finance inventory) are examples. These tend to move after the coincident indicators in a downswing as businessmen reduce their inventories in response to reductions in sales. Similarly "Manufacturing and Trade Inventories" tends to move after coincident indicators in an upswing as businessmen hesitate to increase inventories until they are convinced that sales have increased.

Leading Down From a Peak or Out of a Trough?

The same indicators which lead in a downswing may **not** lead in an upswing, and almost certainly will not do so by the same number of months. Nor will the same indicators which lag in an upswing necessarily lag in a downswing. For example, the "Quit Rate in Manufacturing" (which is employee-initiated terminations, not counting retirements) generally peaks before the economy, but lags behind when the economy hits bottom. People evidently get edgy about leaving a job before the economy hits its peak, and are slow to be reassured as the economy recovers from a slump. It is, therefore, necessary to distinguish whether the economy is heading into a business peak or a trough when identifying an indicator as "leading."

Some examples of leading, coincident, and lagging indicators for a trough are given in Table 1. Examples of leading, coincident, and lagging indicators for a peak are given in Table 2. The number following each indicator gives the average number of months between the month the general economy turned and the month the indicator turned between 1947-1977. Thus, "Average Work Week of Production Workers in Manufacturing" in Table 1 is followed by -2.2, indicating that this series hit bottom and turned up an average of two and two-tenths months **before** the general economy during these years. Similarly "Quit Rate in Manufacturing" of Table 1 is followed by +3.6 indicating that this series hit bottom and turned up an average of 3.6 months **after** the general economy during these years.

The time between the indicator series' move and the business cycle's move varies. A leading series may precede a downturn by eight months in one cycle and by only two months in another. The range of each series timing is indicated by the **standard deviation** which is given in parentheses in Tables 1 and 2. A **standard deviation** is a measure of the variability of the lead and lag times. Each series has led or lagged the business cycle by the number of months given in Table 1 plus or minus its **standard deviation** (the number given in parentheses) 70 percent of the time since 1947. For example, the "Average Workweek of Production Workers in Manufac-

turing” of Table 1 has turned up between 4.2 and .2 months (2.2 plus 2, and 2.2 minus 2) **ahead** of the general economy nearly 70 percent of the time between 1947 and 1977. The rest of the time it turned up either more than 4.2 months before the general economy or less than .2 months before the general economy. Another series, “Quit Rate in Manufacturing” of Table 1 has turned up between 5.7 and 1.5 months (3.6 plus 2.1, and 3.6 minus 2.1) **after** the general economy nearly 70 percent of the time between 1947 and 1977.

Problems With Using a Single Data Series

Suppose you want to know if the economy is about to turn down. If you use a single cyclical indicator such as “New Business Formation” you encounter at least two difficulties.

Sometimes Cyclical Indicators Don't Move When the General Economy Does

Leading indicators don't always lead, nor does each lagging indicator always lag. Each business cycle is different.

For example, “Business Expenditures for New Plant and Equipment in Nominal Dollars” (dollars not adjusted for inflation) was widely used by the BER prior to 1977 as a leading indicator, but in recent years of strong inflation, it has proven unsatisfactory. The nominal dollar expenditures figure actually rose during the first year of the 1973-1974 downswing, declining slightly only in the last quarter of 1974. To give another example, “Manufacturers Unfilled Orders in Durable Goods Industries,” which usually leads the general economy, rose through most of the 1974 recession. “New Business Incorporations,” another supposed leading indicator, also rose for the first third of the 1974 recession period. And in the 1970 recession, “New Building Permits” — whose fall generally precedes a downturn — rose throughout.

Sometimes Cyclical Indicators Move When the General Economy Does Not

A second point to remember when using cyclical indicators as economic signposts is that indicators respond to factors other than business cycles. They respond to expectations, consumer confidence, and a host of other factors which may never manifest themselves as booms or recessions.

Stock prices, for example, fell in 1962 and 1966 while the general economy's growth slowed but did not actually decline.

No single data series is reliable enough to give a really accurate economic temperature reading. An indicator may move before the recession hits in seven out of ten cycles, but fail in the other three. Another indicator may signal a recovery in only one of the ten movements it makes.

Composite Business Cycle Indices

One approach to dealing with the vagaries of individual data series, which is used by the Bureau of Economic Analysis, is to form composite indices. One tests individual indices for their performance, and then uses statistical techniques to combine individual data series into an index which generally is more reliable than any one series.

The composite indices can be more reliable because, while any one data series may fail to move up or down with a business cycle swing, the group as a whole is more likely to do so, and while any one series may fluctuate independently of the cycle, the group as a whole is less likely to do so.

For example, suppose during a recession the leading series on quantity of money (M1) moves up due to some extraordinary government policy while employment, production, consumption, and inventory data are moving down. If you were to rely only on the money series, you would incorrectly predict recovery, whereas if you were to depend on the composite, of which money is only a part, you would probably correctly predict no immediate end to the downswing.

The Bureau of Economic Research currently prepares and publishes three composite indices monthly. They are referred to as (1) the index of twelve leading indicators, (2) the index of four roughly coincident indicators and (3) the index of six lagging indicators. The twelve leading indicators which the BER uses for its composite leading indicator index are given in Table 3. The four coincident indicators which the BER uses for its composite coincident index are given in Table 4, and the six lagging indicators which the BER uses for its composite lag index are given in Table 5. Each series which enters a composite index leads, lags, or coincides with **both** peaks and troughs.

The choice of the series which enter one of these composite indices is described in the *Handbook of Cyclical Indicators*. There are six main criteria for a data series' inclusion in one of the three composite indices: economic significance, statistical adequacy, timing, conformity, smoothness, and currency.

In order to be **economically significant**, a data series must cover an important economic process (employment, **not** sun spots), and must be a broad coverage of that activity (manufacturing employment, **not** employment of hospital managers).

Statistical adequacy implies that the data come from a reliable source with good reporting and error detection devices. Moreover, the data should be comparable over time, that is, the people gathering the data should not change how they measure the data halfway through the series.

In order to be **timely** and have sufficient **conformity** the series has to have performed well since 1947. A data series which lags for two peaks, leads one, lags one, then leads again, is not very useful.

To be **smooth** a series must not swing so wildly that you cannot differentiate between its normal

fluctuations and a fluctuation from a change in the business cycle.

Finally, to be considered for a composite index, a series must have **currency**; that is, it must be both measured frequently (monthly and quarterly data are acceptable) and the data made available quickly. Employment figures for January 1980 are not much help if they only become available in June 1981.

Figure 1 shows how the three composite indices have performed. The solid line on the figure represents monthly data; the Arabic number in the square (10) indicates the latest month for which the data is plotted.

The data is plotted for 1948 to 1981. The dark areas represent downswings in the business cycle. Thus 1948 to early 1949 was a downswing as was 1953 to early 1954, 1957 to early 1958, 1960 to early 1961, 1970, and 1973 to early 1975. The National Bureau of Economic Research, Inc. (NBER) determines when a downswing has occurred, and one does not appear on this chart until they have so decided.

The NBER also decides the official month during which a cycle's peak and trough have occurred. These peaks (P) and troughs (T) are given at the top of the dark areas. Thus the peak of the 1973-75 swing occurred in November 1973, and the trough occurred in March 1975.

You will notice how the Index of Twelve Leading Indicators does indeed peak **before** the business cycle peak and — though by a fewer number of months — does tend to turn up before the rest of the economy. The number of months by which the index of leading indicators' peak or trough preceded the general economy's peak or trough is given next to the plotted index for each business downswing. Thus, in the 1973-1975 cycle, the leading index of indicators peak occurred 9 months before (-9) the general economy's, and its trough occurred 1 month before (-1) the general economy's.

Similarly you can see how the Index of Coinci-

dent indicators tended to move **with** the general business cycle. For example in 1973-1975, there was no difference (0) in the time between the index's movements and the general economy's movements.

And finally, you can see how the index of lagging indicators tended to hit its peak and its low point **after** the general economy. For example, in 1973 this index hit its peak 10 months after (+10) the general economy had hit its peak and started down.

Cautions on Using Composite Indicator Series

When using these indicator series as economic signposts you must realize that the Bureau of Economic Research's use of these particular series as cyclical indicators is based only on thirty years of observations.

As the economy changes, some data series will become less reliable as general economic predictors and others will become more reliable. For example, as our economy depends more on service and less on manufacturing industries, trends in durable goods production may become less reliable cyclical indicators. Again, as oil prices have risen relative to other goods, price indices which include them have become more important as cyclical indicators. Finally, the index of lagging indicators itself, which includes labor cost per unit of output in dollars which have not been adjusted for inflation, has proven considerably less reliable in recent inflationary periods.

The Bureau of Economic Research constantly re-evaluates the data series it uses; any non-statistician who wishes to study the economic climate needs to be equally cautious.

Given this caution, there is no reason that you should not use the published information on these series to improve your knowledge of the economic climate in which you live.

Historic

Table 1. How Some Cyclical Indicators Move During Business Cycle Trough

The number following the series is the average number of months between the month the series turned up and the month the general economy turned up from 1947 to 1977. The number in parenthesis is the standard deviation. Almost 70 percent of the time, the series moved within a range of the average plus or minus the standard deviation. Thus for example, nearly 70 percent of the time the Average Work Week of Production Workers in Manufacturing led the business cycle trough by between .2 and 4.2 months (2.2 - 2.0 and 2.2 + 2.0). The smaller the standard deviation divided by the average -- other things equal -- the better the series.

	Employment	Production and Income	Trade, Orders and Deliveries	Capital Investment	Inventories	Prices and Costs	Money and Credit
Leading Indicators	Average Work Week of Production Workers in Manufacturing -2.2 (2.0) Layoff Rate in Manufacturing (Inverted) -2.2 (1.9)	Industrial Production: Non-durable Manufactures -2.8 (2.3)	New Orders for Consumer Goods and Materials in 1972 Dollars -3.0 (2.4) Vendor Performance, Slower Deliveries -5.2 (3.9)	Index of Net Business Formation -1.8 (1.2) Contracts and Orders of Plant and Equipment in 1972 Dollars -2.6 (1.9) New Building Permits for Private Housing -6.2 (3.5)	Net Change in Inventories On Hand and On Order in 1972 -4.0 (3.3)	Index of Prices of 500 Common Stocks -5.0 (1.6) Changes in Sensitive Prices -5.4 (2.6) Corporate Profits After Taxes in 1972 Dollars -2.6 (2.5)	Money Supply (M 2) in 1972 Dollars -9.0 (4.2) Total Private Borrowing -5.0 (3.2)
Coincident Indicators	Average Weekly Overtime of Production Workers in Manufacturing -.3 (1.2)	Index of Industrial Production -.2 (.4) Rate of Capacity Utilization, Materials -.3 (.2)	Manufacturing and Trade Sales in Current Dollars +.2 (1.5)				
Lagging Indicators	Quit Rate in Manufacturing +3.6 (2.1) Index of Help Wanted Advertising +2.2 (1.9) Average Duration of Unemployment (Inverted) +9.2 (3.8)		Unfilled Orders, Durable Goods Industries +3.7 (3.1)	Backlog of Capital Appropriations in Manufacturing +7.8 (3.7) Non-Residential Fixed Investment Structures, in 1972 Dollars +8.2 (4.2)	Manufacturing and Trade Inventories in 1972 Dollars +3.5 (1.5)	Labor Cost per Unit of Output in Manufacturing +11.2 (1.3)	Average Prime Rate Charged by Banks +11.3 (5.2) Commercial and Industrial Loans Outstanding +5.2 (2.2) Ratio of Consumer Installment Debt to Personal Income +7.2 (1.1)

Table 2. How Some Cyclical Indicators Move During Business Cycle Peak

The number following the series is the average number of months between the month the series turned down and the month the general economy turned down from the peak from 1947 to 1977. The number in parenthesis is the standard deviation. Almost 70 percent of the time, the series moved within a range of the average plus or minus the standard deviation. Thus for example, nearly 70 percent of the time the Average Work Week of Production Workers in Manufacturing led the business cycle trough by between .2 and 4.2 months (2.2 - 2.0 and 2.2 + 2.0). The smaller the standard deviation divided by the average--other things equal--the better the series.

	Employment	Production	Trade, Orders and Deliveries	Capital Investment	Inventories	Prices and Costs	Money and Credit
Leading Indicators	Average Weekly Overtime of Production Workers in Manufacturing -14.0 (5.4)	Rate of Capacity Utilization, Manufacturing -13.2 (7.5)	New Orders Consumer Goods and Materials -10.4 (8.2)	Indexed Net Business Formation -14.5 (6.7)	Net Change in Inventories On Hand and On Order in 1972 Dollars -7.2 (3.5)	Index of Prices of 500 Common Stocks -9.0 (3.2)	Changes in Money Supply (M 1) -21.0 (5.5)
	Manufacturing Layoff Rate (Inverted) -15.0 (7.8)	GNP in 1972 Dollars -1.6 (1.5)	Vendor Performance, Slower Deliveries -9.4 (7.2)	Contracts and Orders, Plants and Equipment in 1972 Dollars -8.4 (2.7)		Corporate Profits After Taxes in 1972 Dollars -13.6 (8.0)	Changes in Total Liquid Assets -9.5 (5.0)
	Index of Help Wanted Advertising -7.2 (5.4)			New Capital Appropriations in Manufacturing -7.2 (6.9)			Delinquency Rate, Consumer Installment Loan (Inverted) -8.7 (7.8)
Coincident Indicators	Employees on Non-Agricultural Payroll -1.4 (2.7)	Personal Income Less Transfer Payments +1.2 (1.6)					Municipal Bond Yield Federal Funds Rate -.5 (4.3)
Lagging Indicators	Average Duration of Unemployment (Inverted) +6 (1.5)				Manufacturing and Trade Inventories in 1972 Dollars +4.5 (3.5)	Labor Costs Per Unit of Output in Manufacturing +6.8 (4.0)	Average Prime Rate Charged by Banks +4.0 (1.9) Commercial and Industrial Loans Outstanding +2.5 (4.4) Ratio of Consumer Installment Debt to Personal Income +4.0 (6.0)

Table 3. The 12 Components of the Leading Indicator Index

Average Work Week of Production Workers in Manufacturing

This measures the average number of hours worked per production worker per week in manufacturing industries. Labor turnover, part-time work and stoppages cause average work week to be low. Overtime hours cause average work week to be high.

Layoff Rate in Manufacturing

This is employer-initiated suspensions which last or are expected to last more than seven days and which are due to lack of orders, model changeover, plant breakdown, etc.

Value of Manufacturers' New Orders for Consumer Goods and Materials in 1972 Dollars

A new order is a communication of an intention to buy. This series measures new orders for durable goods (excluding capital goods and defense products) and for the products of four non-durable goods industries: textile mills, paper, printing, and leather.

Vendor Performance, Percent of Companies Reporting Slow Deliveries

This series shows the percentage of Chicago area purchasing agents who are experiencing slower deliveries in the current month compared with the previous month. Slower deliveries tend to occur when the volume of business is up or from shortages of materials.

Index of Net Business Formation

This is an estimate of the net formation of new businesses. It is based on the number of companies receiving charters each month, on the number of business failures, and on confidential information on telephones installed.

Contracts and Orders for Plant and Equipment in 1972 Dollars

This measures the value of new contract awards to building, public works, and utilities contractors, and of new orders received by manufacturers for capital goods. Capital goods are goods which are used in the production of other goods, such as a steel furnace or a tractor.

Index of New Private Housing Units Authorized by Local Building Permits

This measures month-to-month changes in the number of housing units authorized by local permit-issuing places. This refers to private housing units. It does not include group quarters such as dormitories, rooming houses and transient accommodations such as motels.

Net Change in Inventories on Hand and on Order in 1972 Dollars

This measures month-to-month changes in manufacturing and trade inventories.

Change in Sensitive Prices

This is a price index of crude materials at the wholesale level. It includes potash, crude natural rubber, iron ore, gravel, natural gas, crude petroleum, and bituminous and anthracite coal.

Index of Stock Prices, 500 Common Stocks

This series closely approximates the average movement of the stocks listed on the New York Stock Exchange.

Change in Total Liquid Assets

This is a measure of the U.S. money supply. Liquid assets include currency, demand deposits, time deposits, savings bonds, and negotiable certificates of deposit.

Money Supply: M 1

This is another measure of the U.S. money supply. It consists of currency and demand deposits.

Table 4. The Four Components of the Coincident Indicator Index

Number of Employees on Non-agricultural Payrolls

This measures the total number of employees in mining, construction, trade, manufacturing, general government, finance, insurance, real estate, utilities, other services, communication and transportation.

Personal Income Less Transfer Payments in 1972 Dollars

This measures the inflation-adjusted personal income received by persons, unincorporated businesses and nonprofit institutions, excluding transfer payments. Transfer payments are income for which no current services are being rendered, such as Social Security payments, veterans benefits, food stamps, consumer bad debts, and state unemployment insurance.

Index of Industrial Production, Total

This measures total industrial production in manufacturing, mining and the utilities (electric and gas) industries. It does not cover farm production, the construction, transportation or service industries.

Manufacturing and Trade Sales in 1972 Dollars

This measures the monthly volume of sales of manufacturing, merchant wholesalers' and retail establishments.

Table 5. The Six Components of the Lagging Indicator Index

Average Duration of Unemployment

This measures the average length of time in weeks during which a person classified as unemployed has been continuously looking for work.

Manufacturing and Trade Inventories, Total Book Value in 1972 Dollars

This measures the inventories (goods on hand) of manufacturing, retail, and merchant wholesalers. The value is the book value (the price at which the merchants are carrying this inventory on their books).

Index of Labor Cost per Unit of Output, Total Manufacturing

This measures the relationship between the volume of production of manufactured goods and the cost of the labor involved in that production. This includes wages and salaries, payments in kind, and employer contributions to social insurance.

Average Prime Rate Charged by Banks

This is supposedly the interest rate that banks charge their most credit-worthy business customers on short-term loans.

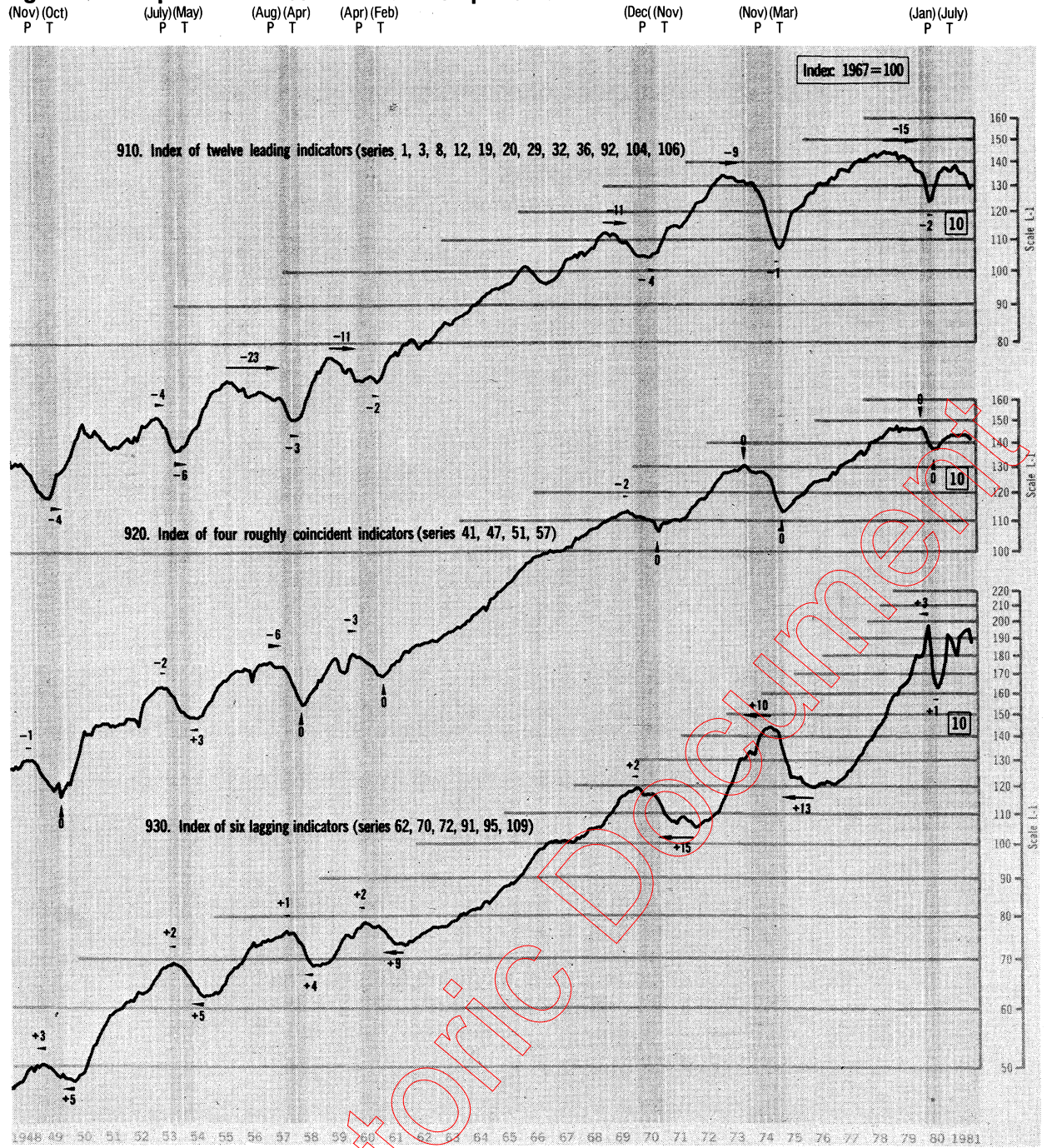
Commercial and Industrial Loans Outstanding

This measures the average dollar amount of business loans outstanding each month. It includes all loans for commercial and industrial purposes (except those secured by real estate) that are reported to the Federal Reserve Board by a sample of over 300 banks.

Ratio of Consumer Installment Debt to Personal Income

This measures 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. Specific examples are credit from retail outlets, for automobiles, and for home improvement. It does not include home mortgages.

Figure 1. Composite Indexes and Their Components



NOTE: Numbers entered on the chart indicate length of leads (-) and lags (+) in months from reference turning dates. Current data for these series are shown on page 60.

Historic

For More Information

NOTE: Most of these publications will be available at a large library.

1. *Business Conditions Digest*, published monthly by the Bureau of Economic Analysis, U.S. Department of Commerce. (May and December 1975 issues discuss choice of data series.)

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Approximate Cost: \$55.00/year

Has one section on the "150 Cyclical Indicators" and one section on 140 "Other Important Economic Measures."

2. *Handbook of Cyclical Indicators*, published by Bureau of Economic Analysis, U.S. Department of Commerce, 1977.

This book has historical data for the various Cyclical Indicators and Other Important Economic Measures.

3. *Survey of Current Business*, published monthly by the Bureau of Economic Analysis, U.S. Department of Commerce.

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Cost: \$35.00/year

This journal contains a general analysis of the business situation. It also contains National Income and Product tables and State and County Annual Personal Income tables. This publication has fewer series and more interpretation and special articles. It has featured, for example, articles on Pollution Abatement and Control Expenditures, 1972-1978, and Government Owned Fixed Capital in the United States, 1928-1979.

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