# Diagnosing the Problem of Inflation and Unemployment in the Western World

## Geoffrey H. Moore

The economic recovery following the recession of 1974–75 has left virtually every industrial country with higher unemployment rates than could be considered normal, as well as with higher inflation rates than could be considered desirable. In some countries, such as France, Italy, the United Kingdom and Canada, the unemployment rate in 1977 was as high as or higher than in 1973, the last year of general prosperity; but the inflation rate was higher also. In the United States, the unemployment rate also was higher in 1977 than in 1973, and the rate of inflation was only slightly lower. Only in West Germany and Japan, where unemployment was substantially higher in 1977 than in 1973, was the inflation rate substantially below what it had been in 1973, although even those countries with inflation at 4 to 5 percent had not achieved what they regarded as a satisfactory position with respect to inflation. Table 1 presents the unemployment and inflation rates for each of these countries for 1973, 1975, and 1977.

Although it is easy to point to this anomaly, it is not easy to explain it, to say nothing of curing it. It is useful, however, to recall that it is not entirely new. Indeed, some 27 years ago Arthur Burns gave expression to the phenomenon in a single phrase that summed up a wealth of experience: "Inflation does not wait for full employment."[1] He was describing the lessons distilled from Wesley Mitchell's studies of business cycles, prior to World War II, and warning that economists might have to relearn this particular one. The advice was warranted then, and it is still relevant. Inflation has not waited for full employment, and those who thought there was no need to worry about inflation as long as there was considerable unemployment have had to learn the lesson the hard way.

What I propose to do in this paper is to show how the situation can be described in a way that is more understandable, if not more palatable. Better understanding may lead to a more rational choice of policies that will effect a cure. What I shall do is examine the behavior of inflation during periods of slow

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[1] Introduction to Wesley C. Mitchell's *What Happens During Business Cycles,* National Bureau of Economic Research, 1951, p. xxi.

TABLE 1

Unemployment Rates and Inflation Rates
in Seven Countries, 1973–77

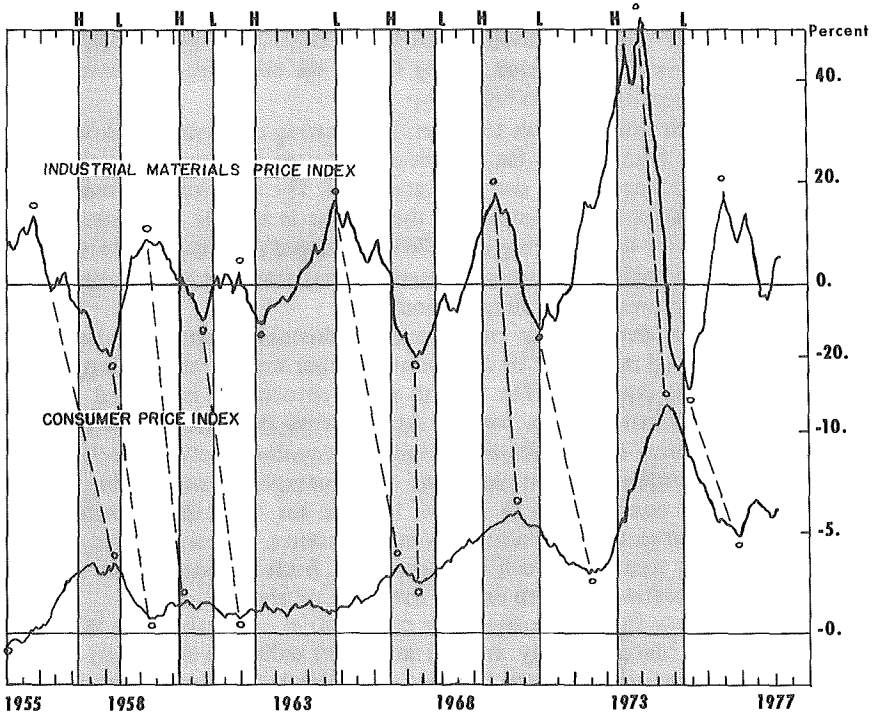|  | Unemployment Rate (%) | | | Inflation Rate, CPI (%) | | |
|---|---|---|---|---|---|---|
|  | 1973 | 1975 | 1977 | 1973 | 1975 | 1977 |
| United States | 5 | 8 | 7 | 9 | 7 | 7 |
| Canada | 6 | 7 | 8 | 9 | 10 | 10 |
| United Kingdom | 3 | 5 | 7 | 10 | 25 | 12 |
| West Germany | 1 | 4 | 4 | 8 | 5 | 4 |
| France | 3 | 4 | 5 | 8 | 10 | 9 |
| Italy | 3 | 3 | 3 | 13 | 11 | 14 |
| Japan | 1 | 2 | 2 | 17 | 8 | 5 |
| Average, 6 countries excluding United States | 3 | 4 | 5 | 11 | 12 | 9 |

Source: Unemployment rates are from the U.S. Bureau of Labor Statistics and are adjusted to U.S. labor force concepts. See Joyanna Moy and Constance Sorrentino, "An Analysis of Unemployment in Nine Industrial Countries," *Monthly Labor Review,* April 1977, Table 2, p. 15, and release dated April 1978. Inflation rates are percent changes in the consumer price index from December of preceding year to December of current year, based on indexes published in *Business Conditions Digest,* U.S. Department of Commerce.

growth or recession on the one hand, and during periods of rapid growth on the other. What we shall find is that, both in the United States and abroad, reductions in the rate of inflation have always been associated with periods of slow growth, and have not occurred at other times. We shall also find that it is important to consider the lags in this relationship, which in the United States at least have been increasing. These lags account in part for the anomaly of high inflation and high unemployment.

In order to distinguish periods of slow growth from periods of rapid growth we shall use the concept of a growth cycle. A growth cycle is, in effect, a business cycle after adjustment for long-run trend. That is, a growth cycle 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.

For the United States, a chronology of growth cycles based on trend-adjusted data in various measures of the physical volume of aggregate economic activity has been developed by the National Bureau of Economic Research, in work initiated by Ilse Mintz. The latest version of this chronology is used in Chart 1 as a backdrop against which to examine the movements in the rate of change in two price indexes. The index of industrial materials prices — which includes commodities such as scrap steel, print cloth and rubber — shows

**Chart 1**
# RATES OF CHANGE IN TWO PRICE INDEXES
# DURING GROWTH CYCLES, UNITED STATES, 1955-77
(measured over 12-month span, smoothed)

INDUSTRIAL MATERIALS PRICE INDEX

CONSUMER PRICE INDEX

Percent

40.

20.

0.

-20.

-10.

-5.

-0.

1955      1958           1963           1968           1973           1977

Shaded areas represent slowdowns in economic growth, as determined from trend-adjusted measures of aggregate output, income, sales and employment.

an especially close relationship to the growth cycle. Downswings in the rate of change in these prices are associated with every period of slow growth or recession (the shaded areas on the chart), upswings with every period of rapid growth (the white areas). Indeed, the downswings often have begun before the onset of the slow growth periods, e.g., in 1956 and 1959. This price index is one of the leading indicators, and its rate of change leads not only the growth cycle but also the rate of change in the consumer price index, the bottom line in the chart.[2] The latter, which of course includes the prices of services as well as commodities, and at retail rather than wholesale, responds to the growth cycle as well, but often with a lag of a year or more. The lags are 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 rise to 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 very pervasive influences upon the price structure. The reaction one sees in the consumer price index (as, for example, the decline in its rate of increase from the autumn of 1974 to the spring of 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 for six other major industrial countries, taken as a group, are employed in Chart 2 to determine whether similar relationships are to be found in these countries. The growth cycle chronology is derived from a composite trend-adjusted index for the six countries combined. This index is based upon measures of the physical volume of economic activity such as real GNP, industrial production, employment and unemployment, so the growth cycle chronology conceptually is similar to that for the United States. The cyclical experience of the six countries is not, of course, entirely similar, and we plan in later work to analyze each one separately, both to check on the validity of our summary treatment and to extend the range of observation.

Rates of change in a composite index of industrial materials prices in five of the six countries (data for Italy are not available) exhibit a sensitivity to the growth cycle similar to that in the United States. Every slowdown in growth has been accompanied by a reduction in the rate of increase in these prices, and often by an absolute decline (i.e., where the line of the chart goes below the zero level). Every period of rapid growth delineated by the trend-adjusted coincident

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[2] Materials price indexes have qualified as leading indicators in four successive NBER studies of this subject — in 1938, 1950, 1960 and 1966. These analyses were made in terms of the index itself, not its rate of change, and pertained to its behavior during business cycles, not growth cycles. In the past ten years or so the index has shown a tendency to lag at business cycle peaks and troughs (see text below), and this was one factor prompting the decision, in the BEA's study in 1975, to use the rate of change in the index, rather than the index itself, as the indicator. At the same time the BEA substituted a more comprehensive index of crude materials prices (excluding foods, feeds and fibers) for the index of more limited coverage that was previously used. In Chart 1 and elsewhere in this paper we use the rate of change in the more restricted index. Both indexes move in rather similar fashion, and the choice as to which is the superior indicator is marginal.

Chart 2
## RATES OF CHANGE IN TWO PRICE INDEXES
## DURING GROWTH CYCLES, SIX COUNTRIES
## EXCLUDING UNITED STATES, 1955-77
(measured over 12-month span, smoothed)
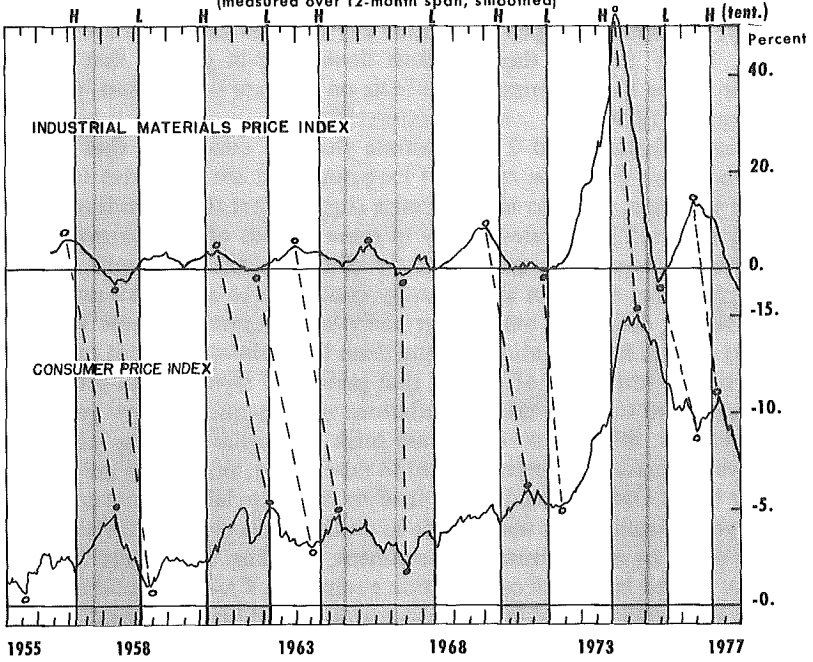


Shaded areas represent slowdowns in economic growth, as determined from the trend-adjusted coincident index for six countries. The six countries are Canada, United Kingdom, West Germany, France, Italy, and Japan. The indexes are weighted by each country's GNP in 1970, in U. S. dollars. The industrial materials index excludes Italy (data not available).

index has been accompanied by an acceleration in materials prices. The consumer price index for the six countries exhibits a delayed response, akin to that in the United States. Taking the delay factor into account, it is possible to trace a relationship both to the materials prices and to the growth cycle (see the dashed lines on the chart, connecting high and low points in the rates of change in the two price indexes).

By comparing Charts 1 and 2 one can observe the close interconnection between the prices of crude materials in the United States and in the six other industrial countries. Most of these materials are traded on world markets, and changes in demand or supply conditions anywhere in the world are registered promptly. Partly through these markets slowdowns in growth that are international in scope have international effects on the rate of inflation, notably in 1957–58 and in 1974–75.

Although Charts 1 and 2 demonstrate that the conditions that make for rates of economic growth in excess of long-run trend are conducive to an acceleration of inflation, they do not of course suggest what those conditions are, or show why inflation accelerates greatly in some periods of rapid growth while in other periods it accelerates only modestly. Similarly, the conditions that make for slow growth or recession are evidently conducive to a reduced rate of inflation or even to deflation, but further analysis is required to show what those conditions are and how variations among them bring about different results.

It is hardly surprising, of course, that periods of rapid growth produce conditions conducive to rising rates of inflation, while periods of slow growth have opposite effects. When new orders are 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 in greater demand, even if higher interest rates must be paid for it, raising costs. Labor unions see better opportunities to get favorable contract 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, it is not always recognized that a rising rate of inflation in the general price level reflects the fact that more prices go up at more frequent intervals, not just that they rise in bigger jumps.

During periods of slow growth or actual decline in aggregate economic activity the opposite conditions prevail. More firms and industries cutback their output, reduce or eliminate overtime, tighten up to shave costs of production, give bigger discounts off list prices, reduce inventories and repay bank debt, postpone new investment projects and stretch out existing ones. Quit rates decline, reducing the cost of labor turnover, 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 subsides.

Many of the processes sketched above are represented among the leading and lagging indicators. In an earlier study I showed that the leading indicators

could be viewed as sensitive measures of demand pressures, and that in the United States their movements during growth cycles were rather effective not only in accounting for the varying leads and lags in the rate of inflation from one growth cycle to another, but also in accounting for the varying amount of change in the rate of inflation in different growth cycles.[3] This analysis can now be brought up to date for the United States and extended to the other six countries as well.

The record of leads and lags (Tables 2 and 3) shows that, both in the United States and in the other six countries taken as a group, the turns in the trend-adjusted leading index and in the rate of change in industrial materials prices lead the growth cycle turns (coincident index) by about four to six months on the average. Furthermore, although the length of these leads varies considerably from one cycle to another, long or short leads in the leading index correspond with long or short leads in the rate of change in materials prices (see the correlation coefficients in the note to the tables). That is, the turning points in the two series are associated with one another. The tables also show that the rates of change in the consumer price index lag behind the growth cycle turns by nine or ten months, on the average, and hence follow the turns in the leading index and in materials prices by a year or more. Again, the variation in the length of lag behind growth-cycle turns is partly accounted for by similar variations in the timing of the leading index or, alternatively, the industrial materials price index. This suggests that, despite the long lag, the turns in the rate of change in the consumer price index are associated with those in the leading index and in industrial materials prices.

It is of some interest to determine whether there has been a long-run shift in the length of the lags in prices vis-à-vis the growth cycle. A test of the U.S. data suggests that the lags in the rate of change in the consumer price index have been getting longer, both with respect to the growth cycle and with respect to the leading index and the materials price index. The leads in the latter two indexes may also have been getting shorter, but this is more conjectural. Regressions in which the dependent variable is the length of lead or lag in months, and the independent variable is the year in which the turn occurred (e.g., 48, 49, etc.) are as follows:

Correlation between Leads and Lags and Time

| | No. of Observations | Regression Coefficients and t-Statistics | | | Regression Estimate* for | |
|---|---|---|---|---|---|---|
| | | $a$ | $b$ | $r$ | 1948 | 1978 |
| Leading index % of trend | 18 | −16.8 (− 1.4) | +.18 (.89) | +.22 | −8 | −3 |
| Materials price, rate of change | 14 | −34.9 (− 1.6) | +.49 (1.43) | +.38 | −11 | +3 |
| Consumer price, rate of change | 15 | −25.8 (−1.8) | +.56 (2.52) | +.57 | +1 | +18 |

*Lead (−) or lag (+) in months.

[3] "Price Behavior during Growth Recessions," *Perspectives on Inflation*, Canadian Studies 36, The Conference Board in Canada, Symposium held January 1974.

The coefficient for time (column b) is positive in all three cases, although it is statistically significant only in the case of the consumer price index. During the 30-year period 1948–78 the regression suggests a substantial shift, with the estimated lag for the CPI increasing by nearly a year and a half. The regressions for the leading index and the materials price index suggest a shift in the same direction, but smaller. In short, the rate of inflation (CPI) lags behind the growth cycle more than it used to, and to a lesser extent, also lags farther behind the wholesale prices of materials and the sensitive leading indicators.[4] One possible reason is the increasing relative importance of services in the CPI and their more sluggish price behavior.[5] Another is the similar tendency exhibited by unit labor costs.[6]

If the leading index is a measure of demand pressure, one would expect that large increases in it would be associated with large increases in the rate of inflation. Tables 4 and 5 show that this is indeed the case. The size of the upswings and downswings in the leading index are positively correlated with those in the rate of change in materials prices and in consumer prices. The swings in materials prices and consumer prices are correlated also. This is true both in the U.S. data and in the figures for the six other countries.

One of the concomitants of slow growth in output is slow growth in employment. In deriving the growth-cycle chronologies used above, several measures of employment, after adjustment for long-run trend, have been used, along with series on output, income and trade. Table 6 gives a conspectus of the change in the unemployment rate and in the employment ratio between the growth-cycle peak and trough dates. Both these measures are, to a degree, adjusted for trend. The unemployment rate (U/L) is the number of unemployed adjusted for the growth in the civilian labor force. The employment ratio (E/P) is the number employed adjusted for the growth in the working-age population. However, these trend adjustments are only approximate. The unemployment rate has exhibited an upward trend in the last decade or so, and so has the employment ratio. In Table 6 we use them without further adjustment.

The table shows that the unemployment rate has risen about 2 percentage points, on the average, during growth-cycle contractions, while the employment ratio has fallen about 1 percentage point. In three of the contractions (1951–52,

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[4] The data in Table 3 for the six other countries do not show a similar trend. The regression coefficients on time are positive for the six-country leading index and for the materials price index but negative for the consumer price index; none of the coefficients, however, is statistically significant.

[5] Phillip Cagan, however, found a trend towards more sluggish response in the wholesale prices of commodities alone, although he concentrated attention upon the amplitude of price change rather than the length of lag. See his "Changes in the Recession Behavior of Wholesale Prices in the 1920's and post-World War II," *Explorations in Economic Research*, Vol. 2, No. 1, Winter 1975, pp. 54–104.

[6] See my "Lessons of the 1973–1976 Recession and Recovery," in *Contemporary Economic Problems*, edited by William Fellner, American Enterprise Institute, 1978.

TABLE 2

Leads and Lags during Growth Cycles: Leading Index and Two Price Indexes, United States

| | | Date of Turn and Lead (−) or Lag (+) in Months | | | | | |
| Growth Cycle[a] | | Leading Index, Deviation from Trend[b] | | Rate of Change in Industrial Materials Price Index[c] | | Rate of Change in Consumer Price Index[c] | |
| Peak | Trough | Peak | Trough | Peak | Trough | Peak | Trough |
|---|---|---|---|---|---|---|---|
| July 48 | Oct. 49 | Jan. 48 (−6) | June 49 (−4) | | | | Jan. 50 (+3) |
| Mar. 51 | July 52 | Aug. 50 (−7) | Nov. 51 (−8) | Jan. 51 (−2) | June 52 (−1) | Feb. 51 (−1) | May 53 (+10) |
| Mar. 53 | Aug. 54 | Mar. 53 (0) | Jan. 54 (−7) | — | — | Oct. 53 (+7) | Jan. 55 (+5) |
| Feb. 57 | Apr. 58 | Sept. 55 (−17) | Jan. 58 (−3) | Dec. 55 (−14) | Apr. 58 (0) | Mar. 58 (+13) | May 59 (+13) |
| Feb. 60 | Feb. 61 | Apr. 59 (−10) | Dec. 60 (−2) | May 59 (−9) | Dec. 60 (−2) | May 60 (+3) | Jan. 62 (+11) |
| May 62 | Oct. 64 | Feb. 62 (−3) | June 62 (−28) | Jan. 62 (−4) | Sept. 62 (−25) | — | — |
| June 66 | Oct. 67 | Mar. 66 (−3) | Jan. 67 (−9) | Nov. 64 (−19) | Apr. 67 (−6) | Oct. 66 (+4) | May 67 (−5) |
| Mar. 69 | Nov. 70 | Jan. 69 (−2) | Nov. 70 (0) | Sept. 69 (+6) | Jan. 71 (+2) | May 70 (+14) | Aug. 72 (+21) |
| Mar. 73 | Mar. 75 | Feb. 73 (−1) | Feb. 75 (−1) | Feb. 74 (+11) | June 75 (+3) | Nov. 74 (+20) | Dec. 76 (+21) |

Average Lead or Lag at Growth Cycle

| | Leading Index | Industrial Materials | Consumer Price |
|---|---|---|---|
| Peaks | −5 | −4 | +9 |
| Troughs | −7 | −4 | +9 |
| All turns | −6 | −4 | +10 |

[a] Based on the concensus of turning points in trend-adjusted data for 19 measures of aggregate output, income, sales and employment. See Victor Zarnowitz and Geoffrey H. Moore, "The Recession and Recovery of 1973–1976," *Explorations in Economics Research,* Fall 1977, NBER, p. 508.

[b] Commerce Department's index (BCD series 910), trend-adjusted by NBER.

[c] Change over 12 months, smoothed (not centered). Centering the rates would increase the leads by six months and reduce the lags by six months.

Note: The correlation coefficients (r) between the leads of the three series are:

| | At Peaks | At Troughs | At All Turns |
|---|---|---|---|
| Leading index and industrial materials price index | +.54 | +.98 | +.76 |
| Leading index and CPI | +.14 (+.64) | +.82 | +.42 (+.72) |
| Industrial materials price and CPI | +.56 (+.74) | +.98 | +.56 (+.67) |

[Coefficients excluding the 1957 peak are shown in parentheses].

## TABLE 3

### Leads and Lags during Growth Cycles: Leading Index and Two Price Indexes, Six Countries excluding United States

| Growth Cycle[a] | | Leading Index, Deviation from Trend | | Rate of Change in Industrial Materials Price Index[c] | | Rate of Change in Consumer Price Index[c] | |
|---|---|---|---|---|---|---|---|
| Peak | Trough | Peak | Trough | Peak | Trough | Peak | Trough |
| Feb. 57 | Jan. 59 | Feb. 57 (0) | June 58 (−7) | Dec. 56 (−2) | June 58 (−7) | June 58 (+16) | July 59 (+6) |
| Mar. 61 | Feb. 63 | May 61 (+2) | Oct. 62 (−4) | Aug. 61 (+5) | Oct. 62 (−4) | Apr. 63 (+25) | Aug. 64 (+18) |
| Sept. 64 | May 68 | Feb. 64 (−7) | June 67 (−11) | Jan. 64 (−8) | July 67 (−10) | June 65 (+9) | Aug. 67 (−9) |
| June 70 | Dec. 71 | Nov. 69 (−7) | Feb. 72 (+2) | Dec. 69 (−6) | Dec. 71 (0) | Sept. 71 (+15) | June 72 (+6) |
| Nov. 73 | Aug. 75 | Feb. 74 (+3) | July 75 (−1) | Mar. 74 (+4) | June 75 (−2) | Oct. 74 (+11) | Aug. 76 (+12) |
| Jan. 77[b] | | July 76 (−6) | | July 76 (−6) | | May 77 (+4) | |
| Average Lead or Lag at Growth Cycle | | | | | | | |
| Peaks | | −2 | | −2 | | +13 | |
| Troughs | | −4 | | −5 | | +10 | |
| All turns | | −3 | | −3 | | +7 | |

[a]Based on six-country coincident index, deviations from trend.

[b]Tentative

[c]Change over 12 months, smoothed (not centered). Centering the rates would increase the leads by six months and reduce the lags by six months.

Note: The correlation coefficients (r) between the leads of the three series are:

| | At Peaks | At Troughs | At All Turns |
|---|---|---|---|
| Leading index and materials price index | +.96 | +.997 | +.95 |
| Leading index and CPI | +.54 | +.61 | +.59 |
| Materials price index and CPI | +.63 | +.65 | +.64 |

20

TABLE 4

Amplitude of Change in Leading Index and in the Rate of Inflation
during Growth Cycles, United States, 1951–75

| Date of Growth Cycle | | Change in Leading Index, Trend-adj.[a] | | Change in Rate of Change (% points) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Indus. Materials Price Index | | Consumer Price Index | |
| High | Low | Low to High | High to Low | Low to High | High to Low | Low to High | High to Low |
| | Oct. 49 | | −14 | | | | |
| Mar. 51 | | 18 | | 108.3 | | 11.1 | |
| | July 52 | | −11 | | −106.9 | | −8.2 |
| Mar. 53 | | 7 | | 12.5$^b$ | | 0.6 | |
| | Aug. 54 | | −14 | | 15.6$^b$ | | −1.8 |
| Feb. 57 | | 18 | | 12.2$^b$ | | 4.1 | |
| | Apr. 58 | | −17 | | −27.7 | | −2.8 |
| Feb. 60 | | 15 | | 23.0 | | 0.9 | |
| | Feb. 61 | | −13 | | −15.9 | | −0.8 |
| May 62 | | 7 | | 9.3 | | 0.4$^b$ | |
| | Oct. 64 | | −4 | | −9.9 | | −0.1$^b$ |
| June 66 | | 8 | | 24.2 | | 2.3$^b$ | |
| | Oct. 67 | | −9 | | −30.8 | | −1.0 |
| Mar. 69 | | 10 | | 32.7 | | 3.6 | |
| | Nov. 70 | | −13 | | −27.4 | | −3.0 |
| Mar. 73 | | 15 | | 62.0 | | 8.3 | |
| | Mar. 75 | | −27 | | −73.8 | | −6.5 |

| Coefficient of correlation (r) | Rises | Falls | Rises and Falls c/ |
|---|---|---|---|
| Leading index and industrial materials price index | +.56 | +.31 | +.40 |
| Leading index and CPI | +.69 | +.52 | +.55 |
| Industrial materials price index and CPI | +.93 | +.90 | +.89 |

Note: For the dates of highs and lows used to measure changes in the leading index and in the rate of change in prices, see Table 2.

$^a$In index points, i.e., in percent of trend.

$^b$Change to growth cycle high or low, since there is no corresponding turn in the price series (see Table 2).

$^c$The correlation is computed without regard to the sign of the rise or fall.

TABLE 5

Amplitude of Change in Leading Index and in the Rate of Inflation
during Growth Cycles, Six Countries
excluding United States, 1957–77

| Date of Growth Cycle | | Change in Leading Index, Trend-adj.[a]/ | | Change in Rate of Change (% points) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Indus. Materials Price Index | | Consumer Price Index | |
| High | Low | Low to High | High to Low | Low to High | High to Low | Low to High | High to Low |
| Feb. 57 | | | | | | | |
| | Jan. 59 | | −6.9 | | −8.8 | | −3.9 |
| Mar. 61 | | 8.2 | | 6.5 | | 4.2 | |
| | Feb. 63 | | −5.4 | | −4.3 | | −2.2 |
| Sept. 64 | | 4.8 | | 5.0 | | 1.7 | |
| | May 68 | | −5.0 | | −6.1 | | −2.6 |
| June 70 | | 6.4 | | 10.2 | | 4.0 | |
| | Dec. 71 | | −9.6 | | −9.1 | | −0.9 |
| Nov. 73 | | 11.8 | | 53.5 | | 9.9 | |
| | Aug. 75 | | −11.6 | | −55.4 | | −6.0 |
| Jan. 77 | | 6.9 | | 16.4 | | 1.8 | |

| Coefficients of Correlation (r) | Rises | Falls | Rises and Falls b/ |
|---|---|---|---|
| Leading index and industrial materials price index | +.89 | +.81 | +.85 |
| Leading index and CPI | +.94 | +.45 | +.69 |
| Industrial materials price index and CPI | +.89 | +.83 | +.82 |

Note: For the dates of highs and lows used to measure changes in the leading index and in the rate of change in prices see Table 3.

aIn index points, i.e., in percent of trend.

bThe correlation is computed without regard to sign of the rise or fall.

22

## TABLE 6

Unemployment Rate and Employment Ratio during Growth Cycles, United States

| Growth Cycle Peak | | | Growth Cycle Trough | | | Change during Growth Cycle Contractions | | Expansions | |
|---|---|---|---|---|---|---|---|---|---|
| Date | Unemp. Rate | Empl. Ratio | Date | Unemp. Rate | Empl. Ratio | Unempl. Rate | Empl. Ratio | Unempl. Rate | Empl. Ratio |
| July 48 | 3.6 | 56.4 | | | | | | | |
| | | | Oct. 49 | 7.9 | 54.1 | 4.3 | −2.3 | | |
| Mar. 51 | 3.4 | 56.3 | | | | | | −4.5 | 2.2 |
| | | | July 52 | 3.2 | 55.2 | −0.2 | −1.1 | | |
| Mar. 53 | 2.6 | 56.2 | | | | | | −0.6 | 1.0 |
| | | | Aug. 54 | 6.0 | 53.6 | 3.4 | −2.6 | | |
| Feb. 57 | 3.9 | 56.1 | | | | | | −2.1 | 2.5 |
| | | | Apr. 58 | 7.4 | 54.0 | 3.5 | −2.1 | | |
| Feb. 60 | 4.8 | 55.0 | | | | | | −2.6 | 1.0 |
| | | | Feb. 61 | 6.9 | 54.3 | 2.1 | −0.7 | | |
| May 62 | 5.5 | 54.3 | | | | | | −1.4 | 0.0 |
| | | | Oct. 64 | 5.1 | 54.4 | −0.4 | 0.1 | | |
| June 66 | 3.8 | 55.5 | | | | | | −1.3 | 1.1 |
| | | | Oct. 67 | 4.0 | 56.0 | 0.2 | 0.5 | | |
| Mar. 69 | 3.4 | 56.4 | | | | | | −0.6 | 0.4 |
| | | | Nov. 70 | 5.9 | 55.7 | 2.5 | −0.7 | | |
| Mar. 73 | 4.9 | 56.9 | | | | | | −1.0 | 1.2 |
| | | | Mar. 75 | 8.5 | 55.2 | 3.6 | −1.7 | | |
| Mean | 4.0 | 55.9 | | 6.1 | 54.7 | 2.1 | −1.2 | −1.8 | 1.2 |
| St. Dev. | 0.9 | 0.8 | | 1.8 | 0.8 | 1.8 | 1.1 | 1.3 | 0.8 |

23

1962–64, 1966–67) the increase in unemployment and decline in employment was small. These were periods of slow growth but not recession. In the other six growth-cycle contractions the rise in unemployment and decline in employment were much more substantial. These periods encompassed recessions. During the intervening periods of rapid growth the decline in the unemployment rate and rise in the employment ratio has been about the same as the opposite changes during contractions, about 2 and 1 percentage points, respectively, reflecting the roughly horizontal trend in these series. The current recovery, incidentally, has been exceptionally vigorous, with a decline of 2.4 percent in the unemployment rate from March 1975 to the latest figure, May 1978, and a rise of 3.4 percent in the employment ratio. The latter is by far the largest increase for any expansion since 1948. With 58.6 percent of the working-age population employed in May, this measure of labor utilization has set a new high record.

One further observation should be made on the basis of Table 6. The declines in the percentage employed during growth-cycle contractions have been getting smaller relative to the increases in the unemployment rate. During the first three contractions the decline in the percentage employed was four-fifths of the rise in the unemployment rate, on the average. During the next three contractions the decline in the percentage employed was only about half the rise in the unemployment rate. During the last three contractions the decline in the percentage employed was less than a third as large as the rise in the unemployment rate.[7] The rise in unemployment during recessions has become less and less a consequence of a decline in employment. Or, to put it differently, the unemployment problem in recessions has become less and less a consequence of a decline in demand, more and more a consequence of an increase in supply.

Table 6 tells us what happens to employment and unemployment during the periods marked off by the growth cycle chronology. It does not say anything about systematic leads or lags. Table 7 provides this information. It shows that on the average during 1948–75 the unemployment rate and the employment ratio were virtually coincident with the turns in the growth cycle. This is not unexpected, of course, but it is in marked contrast both with the leads in the leading index and in the rate of change in materials prices, and with the lags in the consumer price index.

In two respects, however, the leads and lags of employment and unemployment exhibit a relationship to those in the leading index and in the price data. First, they are positively correlated, as the following list shows:

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[7]These comparisons suffer from the fact that the percentages are not computed on the same base. Nevertheless, the conclusion is similar if the unemployment rate is computed on the base of the working-age population instead of the labor force. In the first three growth contractions the decline in the percentage employed was larger than the rise in the percentage unemployed. In the next three the decline in the percentage employed was about the same as the rise in the percentage unemployed. In the last three the decline in the percentage employed was less than half the rise in the percentage unemployed.

## TABLE 7

### Leads and Lags of Unemployment Rate and Employment Ratio during Growth Cycles, United States

| Growth Cycle Peak | Growth Cycle Trough | Unemployment Rate Trough Date | Trough % | Trough Mos. Lead or Lag | Unemployment Rate Peak Date | Peak % | Peak Mos. Lead or Lag | Employment Ratio Peak Date | Peak % | Peak Mos. Lead or Lag | Employment Ratio Trough Date | Trough % | Trough Mos. Lead or Lag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| July 48 | Oct. 49 | Dec. 47 | 3.1 | -7 | Oct. 49 | 7.9 | 0 | July 48 | 56.4 | 0 | Oct. 49 | 54.1 | 0 |
| Mar. 51 | July 52 | May. 51a | 3.0 | +2 | Nov. 51a | 3.5 | -8 | Aug. 50 | 56.1 | -7 | Aug. 52 | 55.0 | +1 |
| Mar. 53 | Aug. 54 | June 53 | 2.5 | +3 | Sept. 54 | 6.1 | +1 | Feb. 53 | 56.3 | -1 | July 54 | 53.4 | -1 |
| Feb. 57 | Apr. 58 | Mar. 57 | 3.7 | +1 | July 58 | 7.5 | +3 | Jan. 56 | 56.3 | -13 | July 58 | 53.9 | +3 |
| Feb. 60 | Feb. 61 | June 59 | 5.0 | -8 | May 61 | 7.1 | +3 | June 60 | 55.3 | +4 | Sept. 61 | 53.9 | +7 |
| May 62 | Oct. 64 | Oct. 62a | 5.4 | +5 | May 63a | 5.9 | -17 | Sept. 62a | 54.5 | -8 | Feb. 63a | 53.9 | -20 |
| June 66 | Oct. 67 | Nov. 66a | 3.6 | +5 | Oct. 67a | 4.0 | 0 | Nov. 66a | 56.0 | +5 | Mar. 67a | 55.4 | -7 |
| Mar. 69 | Nov. 70 | May 69 | 3.4 | +2 | Aug. 71 | 6.1 | +9 | Jan. 70 | 56.7 | +9 | June 71 | 55.2 | +7 |
| Mar. 73 | Mar. 75 | Oct. 73 | 4.7 | +7 | May 75 | 9.0 | +2 | Mar. 74 | 57.4 | +12 | Apr. 75 | 55.1 | +1 |
| Mean | | | 3.8 | +1.1 | | 6.3 | -0.9 | | 56.1 | +0.1 | | 54.4 | -1.0 |
| Standard Deviation | | | 0.9 | 5.2 | | 1.8 | 8.0 | | 0.8 | 8.3 | | 0.7 | 8.3 |

aThese turns pertain to minor movements associated with growth-cycle contractions but not comparable in size with the other cyclical movements in the series.

Correlation between Leads and Lags at Growth Cycle Turns

| Dependent Variable | Independent Variable | No. of Observa- tions | r | Regression Coef. and t–Statistics a | b |
|---|---|---|---|---|---|
| Unemployment rate | Leading index | 18 | +.78 | 4.6 (3.5) | 0.7 (5.0) |
| Employment ratio | Leading index | 18 | +.80 | 5.2 (3.3) | 0.9 (5.3) |
| Consumer price, rate of change | Unemployment rate | 15 | +.43 | 8.2 (4.0) | 0.8 (1.7) |
| Consumer price, rate of change | Employment ratio | 15 | +.50 | 8.5 (4.5) | 0.6 (2.1) |

The constant terms ($a$) tell us that the unemployment rate and employment ratio reach their turns some four or five months after the leading index, as a rule, and some seven or eight months *before* the rate of inflation (CPI).[8]

The second point is that there is some tendency for the unemployment rate and the employment ratio to lag at recent growth-cycle turns. In this respect the trend resembles that shown by the leading index and the rates of price change. Regressions similar to those given earlier are:

Correlation between Leads and Lags and Time

| | Observations | Regression Coef- ficients and t– Statistics a | b | r | Regression Estimate* for 1948 | 1978 |
|---|---|---|---|---|---|---|
| Unemployment rate | 18 | −16.6 (−1.6) | .28 (1.62) | +.37 | −3.2 | +5.2 |
| Employment ratio | 18 | −18.9 (−1.4) | .30 (1.38) | +.33 | −4.5 | +4.5 |

*Lead (−) or lag (+) in months.

The correlation is not statistically significant, and the estimated shift during 1948–78 is not as large as in the case of the rate of change in consumer prices. Nevertheless, it is conceivable that this shift in behavior of these measures of labor market tightness account in part for the changing behavior of the inflation rate. What it is, in turn, that accounts for the shift in timing of the labor utilization measures, if it is a real shift, is another matter. Among the possibilities is the shift in composition of employment towards the service industries, a shift that is more marked in terms of employment than it is in terms of output.[9]

[8] The lags in the rate of inflation depend in part on the interval over which the rate is measured and how the figures are dated. Here we use 12-month change, smoothed, dated in the terminal month. If this rate were centered it would be dated six months earlier, but it could not be observed at that time since the rate would depend upon changes in the index that have not yet occurred. Rates of change over shorter intervals would have shorter lags, but more erratic fluctuations.

[9] See Victor Zarnowitz and Geoffrey H. Moore, "The Recession and Recovery of 1973–1976," *Explorations in Economic Research*, Fall 1977, pp. 493–494.

We have not yet completed a strictly comparable analysis of employment ratios and unemployment rates for countries other than the United States, but earlier results suggest that slowdowns in growth cycles abroad have been accompanied by roughly coincident movements in employment and unemployment (Table 8). Short lags predominate over leads, however, most notably in Japan.

I conclude that not only in the United States but also in other industrial countries declines in the rate of inflation have almost invariably been associated with slowdowns in real economic growth and a diminution in labor utilization rates, *and have not occurred at other times.* This result, it seems to me, is of great importance. For short periods, of the kind encompassed by the growth-cycle concept, it may not be possible — in the sense that it has almost never been done — to achieve rapid growth, an increase in labor utilization rates and reduction in the inflation rate. This does not mean, however, that a reduction in the inflation rate cannot be (i.e., has not been) achieved when labor utilization rates are "high", or that they must be reduced to a "low" level in order to achieve a reduction in the inflation rate. The level of these utilization rates is of less consequence than the direction in which they are moving. When a slowdown starts, labor utilization rates are typically high, and they may remain relatively high throughout the slowdown (as in 1951–52 and 1966–67), but a reduction in the inflation rate takes place nonetheless. But one must always bear in mind, and allow for, the lag.

TABLE 8

Leads and Lags of Employment and Unemployment during Growth Cycles,
Four Countries

|  | Mean Lead (−) or Lag (+) at Growth Cycle | | Standard Deviation of Leads and Lags at Growth Cycle | |
|---|---|---|---|---|
|  | Peaks | Troughs | Peaks | Troughs |
|  | (months) | | (months) | |
| Canada, 1954–70 |  |  |  |  |
| Nonfarm employment, no. | +3.2 | +0.8 | 5.1 | 2.3 |
| Unemployment rate, % | +2.4 | −0.2 | 8.2 | 3.4 |
| United Kingdom, 1951–72 |  |  |  |  |
| Employees in employment, no. | +1.4 | +2.2 | 3.0 | 6.7 |
| Wholly unemployed, no. | +2.8 | 0.0 | 6.3 | 0.7 |
| West Germany, 1952–73 |  |  |  |  |
| Employment, mfg. & mining, no. | +1.5 | +3.5 | 2.1 | 4.0 |
| Unemployment rate, % | −2.3 | +0.4 | 4.5 | 3.2 |
| Japan, 1955–72 |  |  |  |  |
| Regular workers employment, no. | +3.2 | +5.2 | 3.2 | 6.6 |
| Unemployment rate, % | +3.5 | +5.0 | 3.5 | 2.5 |

Source: Geoffrey H. Moore and Philip A. Klein, "Monitoring Business Cycles at Home and Abroad," NBER, manuscript.

Interpreted in this manner, with the aid of both the sensitive and the slower-moving indicators bearing upon prices, costs of production and demand, I believe that the growth-cycle concept and the system of international economic indicators being developed at the NBER, OECD, and cooperating agencies in many countries will prove to be an illuminating instrument to use in observing and appraising trends in the employment-inflation matrix in the Western World.