Slowdowns in Economic Activity and the Rate of Inflation

By Glenn H. Miller, Jr.

Not since the mid-1950s has the level of the Consumer Price Index (CPI) declined on average from one calendar year to the next. But the recent history of almost continuously rising prices does not mean, of course, that the rate of increase of inflation never changes. There has been a good deal of variation since 1965 in the rate of increase of inflation in the U.S., as measured by the CPI (Chart 1).

Experience and analysis both show that reductions in the rate of inflation are associated with slowdowns in economic activity. Indeed, Geoffrey H. Moore has concluded from more than a decade of study of the relationship between economic growth and inflation that "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."

This article provides an extension to mid-1981 of Moore's growth cycle analysis which produces results generally consistent with Moore's earlier findings—i.e., that a downswing in the general inflation rate occurs when there is a downturn in the growth cycle, but with a substantial lag. In an alternative approach, this article also examines the behavior of the inflation rate during times of economic slack, as represented by periods when actual real output has been below its estimated long-run trend level. Such periods—here called trend gap periods—are found to be even more closely related to downswings in the inflation rate than are periods of growth recession, with such downswings beginning in close coincidence with the opening of the trend gaps. It is concluded that both the growth recession approach and the trend gap approach suggest that the present slowing of inflation may not yet have run its course.

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GEOFFREY MOORE ON GROWTH CYCLES AND THE INFLATION RATE

From his studies of the relationship between the observed acceleration and deceleration in inflation and changes in the rate of real economic growth, Moore found not only that there are observable cycles in the rate of inflation, but also that those upswings and downswings in the inflation rate are related to cycles in economic activity.[1] The cycles in economic activity used in Moore's studies are not the traditional business cycles made up of alternating periods of actual growth and contraction

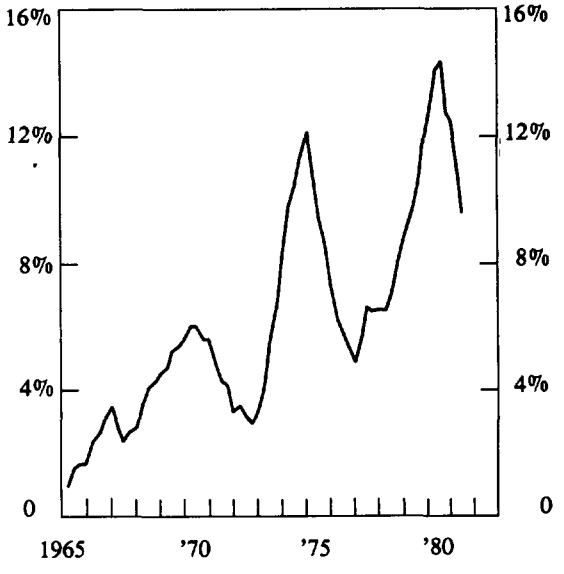
[1] Among his more recent publications, see the following: "The Current State of the International Business Cycle: A New Measurement System," in *Contemporary Economic Problems*, 1978, William Fellner, ed., American Enterprise Institute, 1978, pp. 47-82, and "Sequences in the Inflation Cycle," in the *Morgan Guaranty Survey*, April 1980, pp. 12-14.

in real total output. Rather, he used the concept of "growth cycles" in which periods of rapid growth in economic activity alternate with periods of slow growth, which may include actual business contractions. The rapid growth stage of the cycle is identified as a period when actual growth of economic activity is faster than the long-run trend rate of growth. In a slow growth stage, on the other hand, the actual growth rate is below the long-run trend rate. The slow growth stage of a growth cycle has sometimes been called a "growth recession."

Much of Moore's work on growth and inflation has been devoted to demonstrating that changes in the rate of inflation are related to changes in the stage of the growth cycle and to identifying, for various measures of price change, leads and lags relative to turning points in the growth cycle. Examination of changes in the rate of inflation in relation to the chronology of U.S. growth cycles from 1948 to 1978 led Moore to conclude that the observed "swings in the rate of growth of output were accompanied by swings in the rate of inflation." Furthermore, with regard to downswings in the inflation rate, he concluded that

> . . . declines in the rate of inflation were associated with virtually every growth recession, and did not occur at other times . . . . Contrary to the belief of some, we have not had a continuously accelerating inflation—it has had its downs as well as ups. But the downs have occurred only at times of slower growth, never at times of rapid growth.[2]

Chart 1
RATE OF CHANGE IN CONSUMER PRICE INDEX MEASURED OVER FOUR-QUARTER SPANS UNITED STATES 1965-1981



In addition to the conclusion that declines in the inflation rate occur only when there is a slowdown or contraction in economic activity and not at other times, Moore also identified 1) the presence of lags in changes in the inflation rate with regard to highs and lows in the growth cycle, and 2) the existence of sequences in the inflation cycle due to different timing in the responses of different price measures. In terms of lags, he found that a downturn in the general inflation rate, as measured by the CPI, typically occurs some time later than a downturn in the growth cycle. Furthermore, that lag has apparently been lengthening in recent years—changes in the rate of inflation have been occurring longer after changes in the growth rate of economic activity than was formerly the case. Sequences in the inflation process exist because "prices in some markets

[2] Geoffrey H. Moore, "Price Behavior During Growth Recessions," in *Perspectives On Inflation,* The Conference Board, Canadian Studies No. 36, 1974, p. 25.

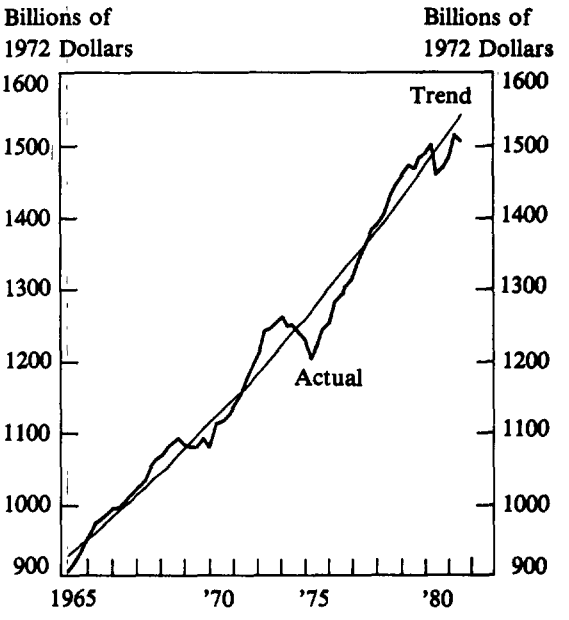
respond much more promptly to demand/supply conditions than in other markets."[3] Moore found that swings in the rate of change in sensitive prices, e.g., the industrial materials price index, generally have preceded swings in the general inflation rate as indicated by the CPI. Thus, in terms of the relationship between growth cycles—which reflect demand/supply conditions—and the sequence of price changes, he concludes:

> Watching both [the CPI and the industrial materials price index], 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 . . . 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.[4]

GROWTH RECESSIONS AND INFLATION SINCE 1965

In this section, Moore's analysis is extended to cover the period from the first quarter of 1965 to the second quarter of 1981, in order to make use of most recent data and to take account of recent major revisions in GNP. Moore's growth-cycle analysis is essentially repeated, using the CPI as the indicator of the general inflation rate and the index of 13 raw industrial materials prices as the sensitive measure. Moore's analysis also is applied with price series other than the CPI as measures of the general inflation rate.[5]

Chart 2
REAL GROSS NATIONAL PRODUCT, ACTUAL AND TREND
UNITED STATES
1965-1981



From the beginning of 1965 through the first half of 1981, real GNP in the U.S. is estimated to have grown at an average annual rate of 3.15 percent. That estimated constant trend rate of growth is depicted in Chart 2, along with the actual path of real GNP growth for that period.

[3] Moore, "Sequences in the Inflation Cycle," p. 13.

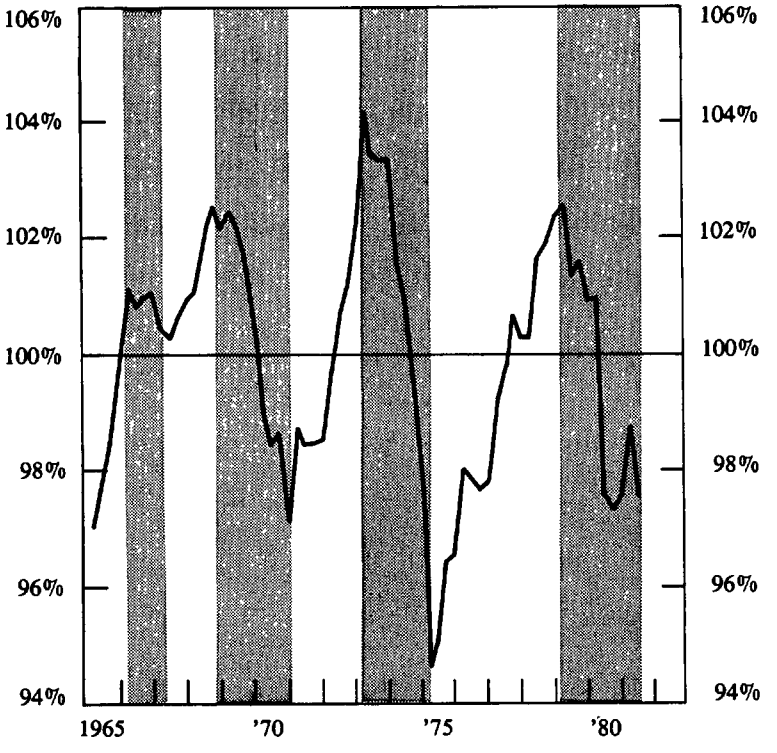
[4] Moore, "The Current State of the International Business Cycle: A New Measurement System," in *Contemporary Economic Problems,* 1978, William Fellner, ed., American Enterprise Institute, 1978, pp. 68-69.

[5] There are a number of differences between Moore's analysis and that used in this article. Moore's dating of growth cycle highs and lows incorporates the use of a number of data series on output, income, sales, and employment, while this article uses only real GNP for that purpose. This article uses an estimate of the trend in real GNP that results from regressing real GNP on time, an approach that departs from Moore's in which a broader approach to the concept of reference cycles is used, and in which the trend in aggregate economic activity is calculated using a long-term moving average. Finally, this article uses quarterly rather than monthly data.

The trend rate of growth of real output is estimated in order to identify more easily the highs and lows of growth cycles in economic activity, and thus the duration of the high growth and low growth phases of the growth cycles as well. This identification is most easily accomplished from an examination of changes in the ratio of actual real GNP to the estimated trend level of real GNP. Movements in that ratio are shown in Chart 3, where upward movements in the ratio represent high growth phases of the growth cycle in economic activity (when actual real output is growing faster than the estimated trend rate of growth) and downward movements represent low growth phases (when actual real output is growing more slowly than the estimated trend rate of growth). Periods of low growth are shown as shaded areas on the chart.

Highs and lows of the growth cycles in real GNP are also readily identified from Chart 3. Growth cycle highs occurred in 1966:I,

Chart 3
REAL GROSS NATIONAL PRODUCT, ACTUAL LEVEL AS PERCENT OF ESTIMATED TREND LEVEL UNITED STATES 1965-1981

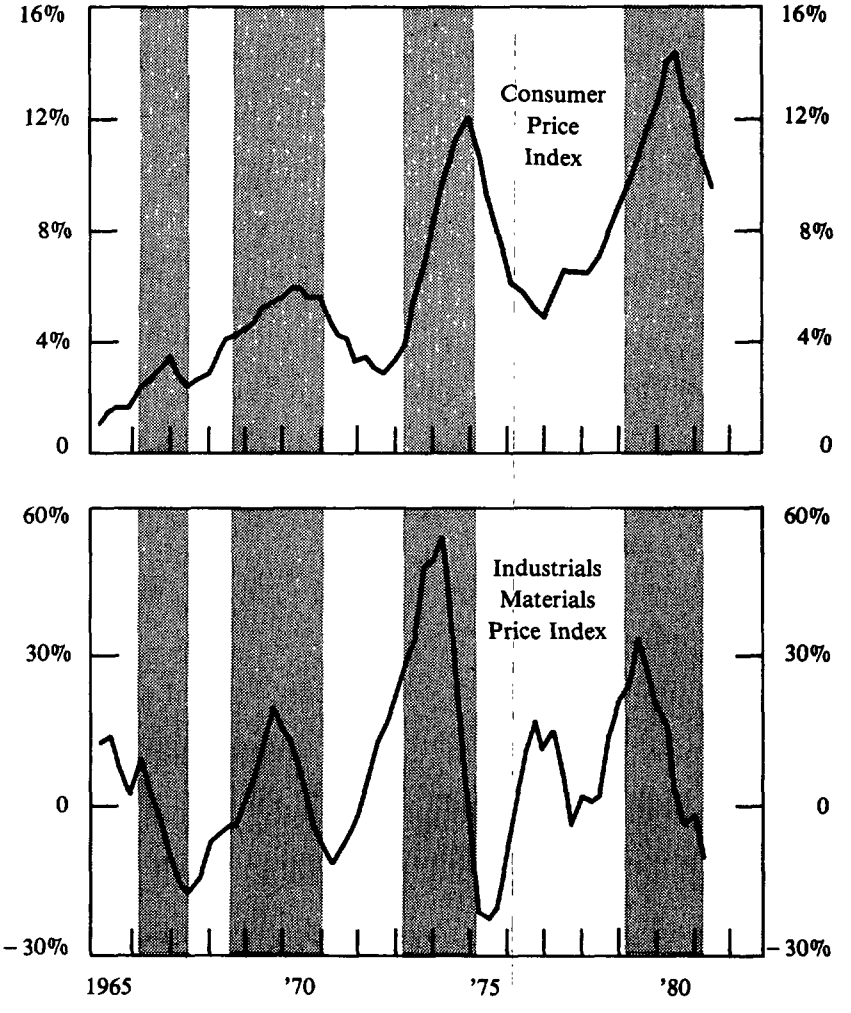


Shaded areas represent periods of slowdown in economic growth.

1968:III, 1973:I, and 1979:I. Growth cycle lows are recorded in 1967:II, 1970:IV, and 1975:I. Thus, low economic growth periods existed from 1966:I to 1967:II, from 1968:III to 1970:IV, from 1973:I to 1975:I, and, finally, from 1979:I forward.

The growth cycle chronology shown in Chart 3 is used as a backdrop in Chart 4, where the

Chart 4
RATE OF CHANGE IN CONSUMER PRICE INDEX AND INDUSTRIAL MATERIALS PRICE INDEX DURING GROWTH CYCLES UNITED STATES 1965-1981



Price changes measured over four quarter spans.
Shaded areas represent periods of slowdown in economic growth.

Table 1

PRICE SERIES GROWTH RATE TURNING POINTS: TIMING RELATIVE TO GNP GROWTH CYCLE HIGHS AND LOWS

Price Series	Growth Cycle High	Series Peak Timing	Number of Quarters	Growth Cycle Low	Series Trough Timing	Number of Quarters
CPI-U, All Items	1966:I	Lags	3	1967:II	Coincides	—
	1968:III	Lags	6	1970:IV	Lags	7
	1973:I	Lags	7	1975:I	Lags	7
	1979:I	Lags	5			
CPI-U, All Items Less Food and Energy	1966:I	Lags	4	1967:II	Lags	1
	1968:III	Lags	9	1970:IV	Lags	9
	1973:I	Lags	8	1975:I	Lags	11
	1979:I	Lags	5			
Tuesday Spot Prices, Industrial Materials	1966:I	Leads	5	1967:II	Coincides	—
	1968:III	Lags	4	1970:IV	Lags	1
	1973:I	Lags	4	1975:I	Coincides	—
	1979:I	Lags	1			
GNP, Implicit Price Deflator	1966:I	Lags	3	1967:II	Coincides	—
	1968:III	Lags	6	1970:IV	Lags	7
	1973:I	Lags	8	1975:I	Lags	7
	1979:I	Lags	8			
PCE, Implicit Price Deflator	1966:I	Lags	3	1967:II	Lags	1
	1968:III	Lags	6	1970:IV	Lags	7
	1973:I	Lags	7	1975:I	Lags	6
	1979:I	Lags	5			

Note: Price series changes are measured over four-quarter spans.

shaded areas again represent periods of slowdown in economic growth. Against that backdrop are shown movements in the rate of change, measured over four-quarter spans, in the CPI and in the index of 13 raw industrial materials prices (Industrial Materials Index). The latter index is used here as a measure of prices that are particularly sensitive to changing demand/supply relationships.

Swings in the rate of price change are evident in Chart 4 for both indexes and are associated with swings in the growth cycle only with a lag. The downturn in the rate of CPI inflation lags the downturn in the growth cycle in each instance. With the exception of the 1966 growth cycle downturn, the downturns in the rate of Industrial Materials Index price change also lag the growth cycle downturns, but not by as long as the CPI changes do. Thus, the downturn in the rate of change of the more responsive Industrial Materials Index leads the downswing in the CPI, the more general inflation measure. This sequence of change may also be seen from the data on Table 1 on the timing of lags in the price rate changes relative to turns in the growth cycle. These results are in keeping with

the general contours of Moore's conclusion that declines in the rate of inflation have been associated with growth recessions, but with a lag, and that swings in the rate of change in sensitive prices generally have preceded swings in the general inflation rate.

The notion of an underlying rate of inflation built into the economy has received increasing attention in recent years. A number of indicators of the underlying inflation rate have been suggested, including the CPI less food and energy. Using that indicator in the analysis shows that the CPI less food and energy also lags downturns in the growth cycle as well as swings in industrial materials prices. However, the lags are slightly longer for this measure of the underlying inflation rate than for the total CPI at three of the four growth cycle downturns since 1965 and equivalent at the fourth (Table 1).

Table 1 also includes several other measures of price change, along with the timing of swings in each with reference to growth cycle turns. A scanning of the table suggests that the choice of a measure of price change from this group does not very much affect the conclusions about either the lags in inflation rate swings with regard to the growth cycle, or the sequence in the inflation cycle. For example, the Personal Consumption Expenditures Deflator has lags that are identical to those of the CPI with reference to growth cycle downturns.

INFLATION RATE CHANGES AND GNP TREND GAPS

There are ways other than growth-cycle analysis of studying the relationship between changes in the inflation rate and economic activity. One way is to examine the swings in the inflation rate with reference to whether or not the level of actual real GNP is above or below the estimated trend level of real GNP. Although the estimated long-run trend of real GNP is not the same as potential GNP, such an approach is much akin to potential-actual GNP gap analysis.

In this article, periods when actual real GNP is *below* its estimated trend value will be called GNP trend gap periods. Since the end of 1965 there have been two such completed GNP trend gap periods—from 1970:I through 1972:I, and from 1974:III through 1977:II (Chart 2). There was also one incomplete trend gap period, beginning with 1980:II and lasting through 1981:II.

The timing of the downturns in the CPI inflation rate in the 1970s was more closely related to the opening of a trend gap than to a downturn in the growth cycle. The GNP trend gap chronology is used as a backdrop in Chart 5, where the shaded areas represent those periods in which actual real GNP was smaller than the estimated trend level of real GNP. Chart 5 shows that very nearly all of the downswings in the CPI inflation rate during the 1970s came during the two GNP trend gap periods. Furthermore, both Chart 5 and Table 2 show that the timing of the beginning of a decline in the rate of CPI inflation was closely related to the opening of a GNP trend gap—as designated by the initial quarter when actual GNP is below its trend level. Finally, a comparison with Table 1 demonstrates the closer relationship of CPI downturns to the appearance of trend gaps than to downturns in the growth cycle.

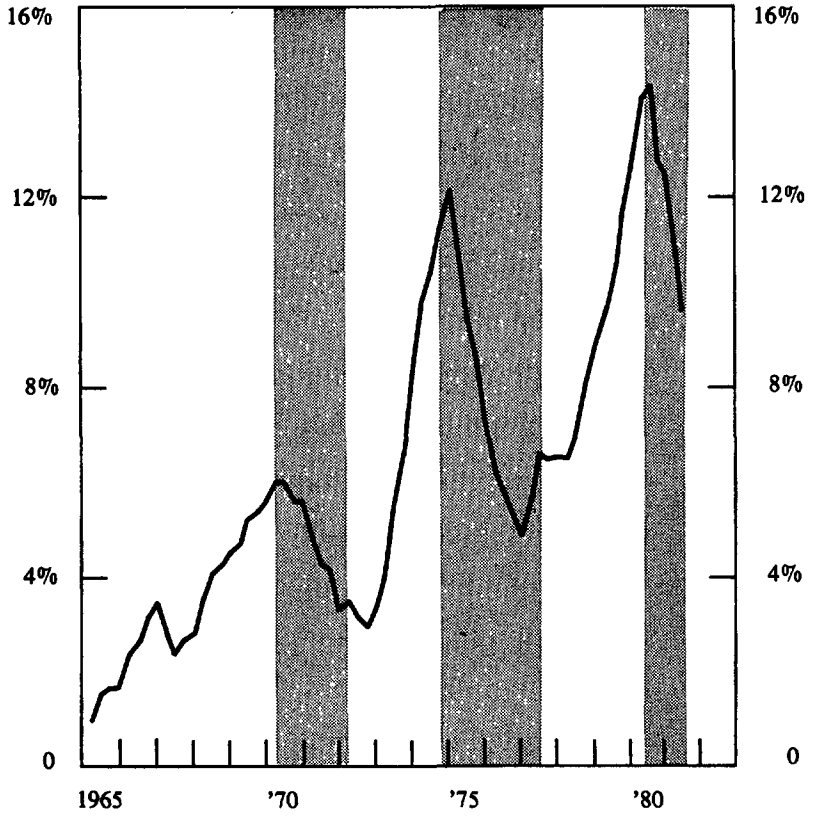
Other measures of price change behave similarly to the CPI in relation to the appearance of GNP trend gaps (Table 2). The PCE deflator registered a timing pattern identical to that for the CPI, while the GNP deflator and CPI less food and energy demonstrate a somewhat less close relationship to the opening of trend gaps in the 1970s. The sequence within the inflation cycle itself is not changed, of course, but the Industrial Materials Index—which lagged in the 1970s with reference to upper turning points in the growth

cycle—leads the appearance of GNP trend gaps.

Somewhat different conclusions about the relationship between declines in the inflation rate and economic activity are arrived at, depending on whether one uses the growth cycle chronology or the GNP trend gap analysis. From the growth-cycle analysis it may be concluded that downswings in the general inflation rate come when there is a downturn in the growth cycle, but with a substantial lag—as Moore has clearly pointed out. The GNP trend gap analysis suggests that the opening of a GNP trend gap is required for the appearance of a downswing in the general inflation rate, and that such a downswing begins in close coincidence with the opening of the trend gap.

In either case, the deceleration of inflation occurs in response to a slowing in the pace of economic activity and a related lessening of the

Chart 5
RATE OF CHANGE IN CONSUMER PRICE INDEX DURING TREND GAP PERIODS UNITED STATES 1965-1981



Price change measured over four quarter spans.
Shaded areas represent trend gap periods.

Table 2
PRICE SERIES GROWTH RATE TURNING POINTS: TIMING RELATIVE TO INITIAL QUARTER AND FINAL QUARTER OF GNP TREND GAPS

Price Series	Initial Quarter of Gap	Series Peak Timing	Number of Quarters	Final Quarter of Gap	Series Trough Timing	Number of Quarters
CPI-U, All Items	1970:I	Coincides	—	1972:I	Lags	2
	1974:III	Lags	1	1977:II	Leads	2
	1980:II	Coincides	—			
CPI-U, All Items Less Food and Energy	1970:I	Lags	3	1972:I	Lags	4
	1974:III	Lags	2	1977:II	Lags	2
	1980:II	Coincides	—			
Tuesday Spot Prices, Industrial Materials	1970:I	Leads	2	1972:I	Leads	4
	1974:III	Leads	2	1977:II	Leads	8
	1980:II	Leads	4			
GNP, Implicit Price Deflator	1970:I	Coincides	—	1972:I	Lags	2
	1974:III	Lags	2	1977:II	Leads	2
	1980:II	Lags	3			
PCE, Implicit Price Deflator	1970:I	Coincides	—	1972:I	Lags	2
	1974:III	Lags	1	1977:II	Leads	3
	1980:II	Coincides	—			

Note: Price Series changes are measured over four-quarter spans.

pressure of total demand on productive capacity. When that pressure is reduced enough so as to produce GNP trend gaps, the inflation rate responds by decreasing significantly. In short, a reduction in the general rate of inflation doesn't begin until some slack exists in the economy. Finally, it appears that inflation begins to speed up again at, or very near, the time that the GNP trend gap is closed.[6]

THE EARLY 1980s EXPERIENCE: SLOWER GROWTH AND REDUCED INFLATION

A growth cycle peak was apparently reached in the first quarter of 1979, and the ensuing period of slow growth lasted at least through the first half of 1981. That period included the brief recession of 1980, which also ushered in a GNP trend gap period that continued at least to mid-1981. The initial quarter of the trend gap period was 1980:II, when actual real GNP fell below its estimated trend level for the first time since the third quarter of 1977. Real GNP then remained below trend through the second quarter of 1981.

The rate of inflation as measured by the CPI

6 Geoffrey Moore has pointed out that the dates of the trend gap periods are very dependent on the method of trend-fitting. He concludes that for this reason, the growth cycle analysis (which is much less susceptible to such variations) is preferable. Personal correspondence, August 23, 1981.

continued to accelerate following the growth cycle peak, and reached its own series peak in the second quarter of 1980 (Chart 4). The five-quarter lag between the downturn in the growth cycle and the downturn in the rate of CPI inflation was about equal to the average of such lags since 1965 (Table 1). Thus, the first downswing in the inflation rate in the 1980s continued the pattern of such declines being associated with growth recessions, but with a lag. Furthermore, a swing in the rate of change in sensitive prices again preceded the swing in the general inflation rate, as the Industrial Materials Index turned down four quarters before the CPI did so (Table 1).

The close relationship between a downswing in the CPI inflation rate and the appearance of a GNP trend gap also was repeated in the 1980-81 experience. The peak in the CPI inflation rate in 1980:II coincided with the opening of a trend gap, i.e., in 1980:II actual real GNP fell below its trend level.

The rate of CPI inflation, measured over four-quarter spans, has fallen from its peak of about 14.5 percent in 1980:II to about 9.7 percent in 1981:II. On the basis of the relationship between changes in the inflation rate and economic activity, whether using the growth cycle chronology or the trend gap analysis, there is reason to expect some further declines in the CPI inflation rate. Table 1 suggests a substantial lag—more than four quarters on average—between an upturn in the growth cycle and an upturn in the rate of increase of the CPI. With no evidence yet that a low in the growth cycle has been reached, several more quarters of decline in the CPI inflation rate may follow.

A similar result is suggested by trend gap analysis. Table 2 and Chart 5 suggest that the rate of CPI inflation begins to accelerate at or near the close of a trend gap period—i.e., the final quarter in which actual real GNP is smaller than its trend level. In its Mid Session Review of the 1982 Budget, the administration forecast real GNP growth of 2.5 percent from 1980:IV to 1981:IV, and 5.2 percent from 1981:IV to 1982:IV. The trend rate of growth of real GNP may be assumed to continue to average 3.15 percent per year through 1982. With this assumed trend growth and the administration's forecast actual growth in real GNP, the present GNP trend gap would continue to exist through the fourth quarter of 1982.[7] This suggests that, on the basis of past relationships, several more quarters of deceleration in the CPI inflation rate may occur. Of course, these expectations suppose no serious shocks to the U.S. economy from unforeseen events. At the same time, however, additional improvement in the general price level might well come if inflationary expectations are significantly reduced as a result of fiscal and monetary policies implemented in 1981.

SUMMARY

Downswings in the rate of inflation continue to be associated with slowdowns in economic activity, whether indicated by growth recessions or the appearance of GNP trend gap periods. Such relationships have been present from the beginning of 1965 to at least mid-1981. During that time, downswings in the CPI inflation rate appear to have been more closely related to trend gap periods than to growth recessions. Both approaches suggest that on the basis of past relationships, a further period of improvement on the inflation front may be in store.

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[7] The forecast level of real GNP is 1982:IV would be about $1,602 billion and the estimated trend level would be about $1,619 billion.