

# ECONOMIC COMMENTARY

Federal Reserve Bank of Cleveland

## Assessing Progress toward Price Stability: Looking Forward and Looking Backward

by John B. Carlson

*We will be at price stability when households and businesses need not factor expectations of changes in the average level of prices into their decisions. How those expectations form is not always easy to discern, and they can for periods of time appear to be at variance with underlying economic forces. But history tells us that it is economic and financial forces and their consequences for realized inflation that ultimately shape inflation expectations.*

Alan Greenspan<sup>1</sup>

**I**nflation, as measured by the rate of change of the Consumer Price Index (CPI), has slowed substantially in recent years. Since 1990, it has averaged less than 3 percent, compared with an average rate of about 5 percent in the previous three years (see figure 1). Similarly, other measures, designed to exclude transitory special factors and focus on the so-called core or underlying rate of inflation, have also slowed to around 3 percent. From the perspective of this rear-view mirror, it seems evident that the deceleration in prices has stopped, as both measures have tended to stabilize around the recent lower mean levels.

Survey data on inflation expectations of households and professional forecasters, on the other hand, suggest that not all of the decline is permanent and that the price level will tend to rise slightly over the coming year. Although survey data provide some forward-looking element, the problems associated with measuring inflation expectations are well known.

The high cost of obtaining information via surveys limits their scope and frequency. Ascertaining the appropriate information with the right questions is difficult, and imperfect survey methods invariably lead to sampling error.

Nevertheless, policymakers cannot always depend on the rear-view mirror as a guide to where the price level might be headed. Traditional economic thinking holds that the impact of monetary policy affects inflation only with a significant lag. Thus, an overly stimulative policy stance may not become evident until it is too late to be turned around without wrenching consequences.

Such a situation is sometimes likened to a freighter with a full head of steam. The captain must take actions well in advance if he is to alter the course of the ship and avoid treacherous shoals. The experience of the 1970s, when double-digit inflation rates reigned, is typically offered as a case in point of the failure of policy to act preemptively. Most analysts agree that appropriate countermeasures were not taken soon enough.

The purpose of this *Economic Commentary* is to examine more closely the problem of assessing the inflationary effects of current policy. I first describe how a selected measure of core inflation excludes potential transitory effects. I review the behavior of this measure since 1982, then contrast the pattern of core inflation with house-

**Inflation moderated in the early 1990s, as revealed by the Consumer Price Index and measures of core inflation. Significant changes in inflation have been infrequent and rather abrupt over the past decade and have coincided with similar changes in inflation expectations. Although survey data from both consumers and professional forecasters suggest that expected inflation has been an unbiased predictor of future inflation, recent experience indicates a persistent overprediction. Nevertheless, the timing between changes in actual and expected inflation implies that both are driven by the same factors; that is, expectations are formed rationally.**

hold expectations one year ahead. Although their mean inflation expectations have historically been unbiased, households have overpredicted inflation in recent years. The survey data of professional forecasters reveal a similar, albeit less pronounced, tendency.

### ■ Core Inflation

Core inflation measures are generally designed to extract the long-run, or permanent, component of the measured price index by filtering out transitory special factors. For example, food and energy components of the CPI are subject to periodic supply shocks that produce relatively large but short-lived (although sometimes persistent) shifts in the index

that are unrelated to more permanent changes. Although food and energy are among the more volatile components of the CPI, other comparably volatile components remain in the core inflation measure; thus, the CPI excluding food and energy is somewhat arbitrary.

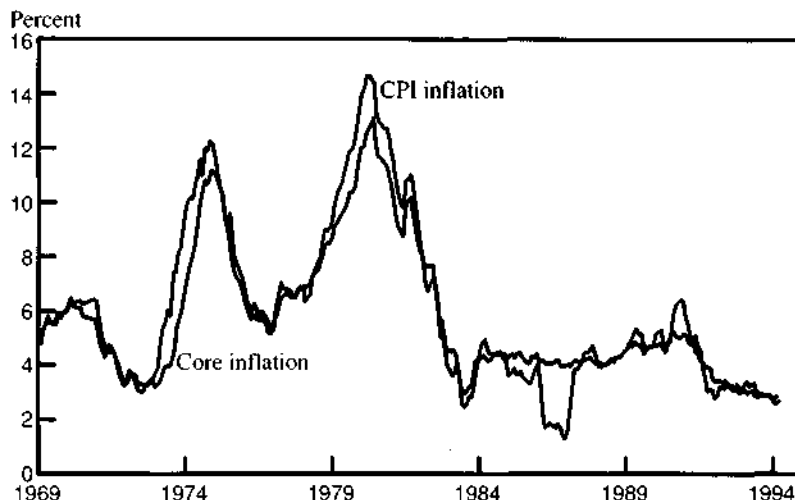
One alternative measure of core inflation proposed in a recent Federal Reserve Bank of Cleveland study does not preselect any particular sectors for exclusion.<sup>2</sup> Rather, it is calculated by trimming the outlying portions of the cross-sectional distribution of the components of aggregate price indices in each month. Thus, it does not single out any sector as the primary source of transitory distortion for all periods. More specifically, the authors consider a trimmed mean that represents the weighted average of the central 85 percent of the price-change distribution. They chose the 15 percent trimmed mean because it had the smallest monthly variance of all estimators of this type.

Figure 2 illustrates core inflation as measured by the 15 percent trimmed mean since 1982, along with trend rates of change within selected subperiods. Statistical change-point methods have identified these as periods in which the mean inflation rate is essentially fixed and deviations from the mean are random and independent from period to period.<sup>3</sup> One implication of these results is that the best guess of inflation in any period is its mean value in that period.

The success of this measure in excluding transitory special factors is best highlighted when contrasted with the behavior of the CPI around 1985–86 (see figure 1). At that time, the dip in the CPI was largely held to be the result of a transitory decline in oil prices. The 15 percent trimmed mean showed no such downturn.

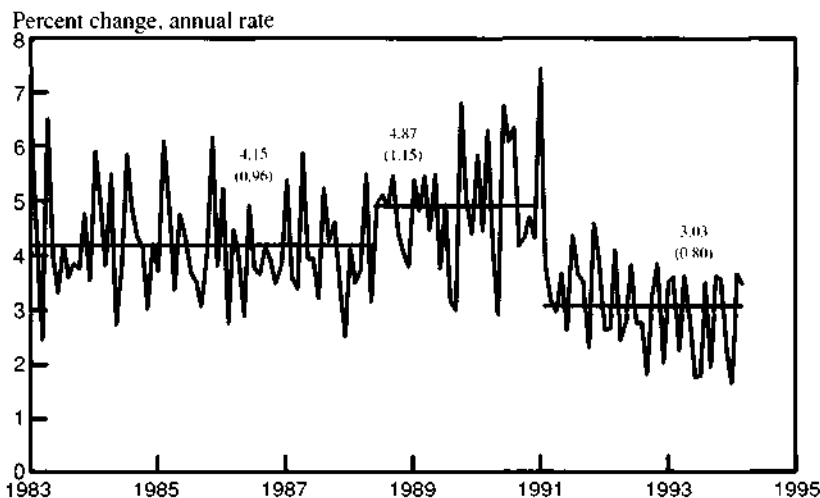
Although the trend in the core measure has changed since 1982, the statistical change-point procedures find that such shifts have been infrequent and rather abrupt. Core inflation first accelerated moderately around May 1988, then fell

**FIGURE 1 INFLATION AND CORE INFLATION OVER PREVIOUS 12 MONTHS**



SOURCES: U.S. Department of Labor, Bureau of Labor Statistics; and the Federal Reserve Bank of Cleveland.

**FIGURE 2 CORE INFLATION, 1983–94**



NOTE: Numbers above solid rules indicate central tendency. Numbers in parentheses are standard deviations of central tendency.

SOURCE: Federal Reserve Bank of Cleveland.

sharply between January and February 1991—at the same time the Persian Gulf War was resolved, eliminating a great deal of uncertainty about the future of oil prices.<sup>4</sup>

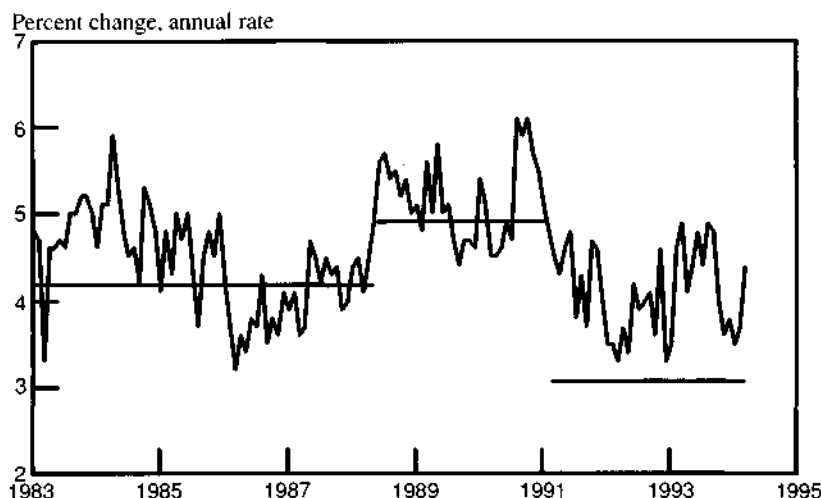
Interestingly, the variability of core inflation around means within periods tended to rise and fall with the mean level of change. The standard deviation of core inflation since 1991 has been less than 1 percentage point, suggesting that inflation has fallen in some per-

manent sense to rates not seen since the mid-1960s.

#### ■ Household Inflation Expectations

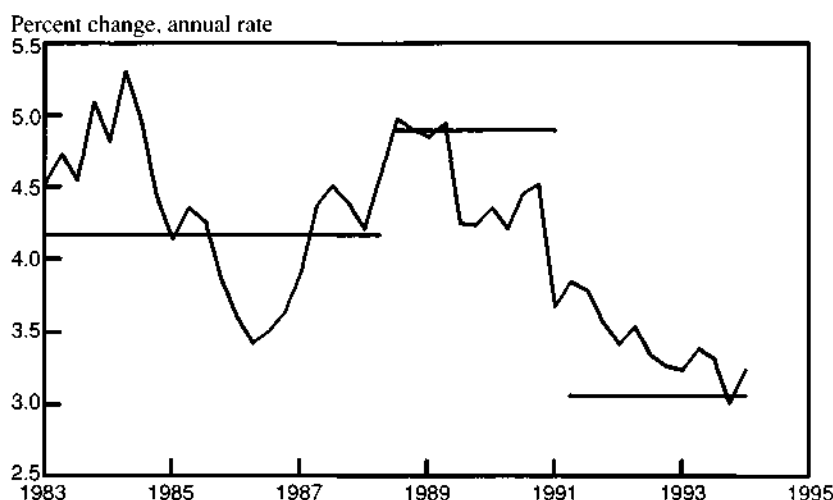
The Survey of Consumers conducted by the University of Michigan asks households what they expect the inflation rate to be over the following 12 months. Although the responses have at times been at odds with realized inflation, household forecasts have generally been unbiased.<sup>5</sup> Figure 3 reveals that from early 1983 to 1991, household inflation expectations were, on average,

**FIGURE 3 ONE-YEAR-AHEAD INFLATION EXPECTATIONS:  
MICHIGAN SURVEY MEAN, 1983-94**



NOTE: Solid rules indicate central tendency.  
SOURCE: University of Michigan, Survey of Consumers.

**FIGURE 4 ONE-YEAR-AHEAD INFLATION EXPECTATIONS:  
PHILADELPHIA SURVEY, 1983-94**



NOTE: Solid rules indicate central tendency.  
SOURCE: Federal Reserve Bank of Philadelphia.

consistent with trend rates within sub-periods delineated by change points in the core inflation measure. Although expectations fell sharply in early 1991, the average expected inflation rate has exceeded actual trend rates since then.

Relatively permanent changes in household inflation expectations coincided closely with substantial and abrupt changes in the mean of core inflation, such as between May and June 1988 and between January and February 1991. The latter break occurred pre-

cisely at the climax of the Persian Gulf War. It appears that such events can trigger a watershed change in expectations.<sup>6</sup> In the four or five years prior to the Gulf War victory, price pressures had been building. Although a series of policy actions had been taken to contain and even reduce inflation, households remained unconvinced and were generally correct: Inflation advanced at higher rates until the conflict ended. The timely resolution of the war and the prospect for permanently lower oil

prices may have been a turning point for the inflation outlook.

The coincidental nature of changes in both expected inflation and actual core inflation suggests that households did not anticipate the *timing* of these changes. Had they done so, expected inflation would have changed less abruptly and would have begun falling prior to the decline in the actual core rate. Moreover, the coincidence in timing is consistent with the idea that household expectations have been rational, responding to the same factors that determine actual prices. What is curious is that households have not been persuaded that lower levels of inflation since early 1991 are permanent.

#### ■ Expectations of Professional Forecasters

The Federal Reserve Bank of Philadelphia conducts a quarterly survey of professional forecasters on their expectations for inflation over the next four quarters. Historically, surveys of professional economists have tended to exhibit some bias.<sup>7</sup> The series compiled by the Philadelphia Fed beginning in 1983, as shown in figure 4, indicates that these respondents have been more upbeat than households about the inflation outlook.

As is true with household surveys (though to a lesser extent), large changes in the expectations of professional forecasters appear to coincide with breaks in the core inflation series. Professional forecasters tended to anticipate the change point in 1991, however, as the series began to descend more than a year earlier than did actual inflation. Nevertheless, they too have overpredicted inflation during the past two years.

#### ■ Concluding Thoughts

Substantial and rather abrupt changes in core inflation since 1982 have generally been accompanied by significant changes in the inflation expectations of both households and professional forecasters. The coincidence in timing suggests that these expectations are driven by the same factors that determine actual changes in the price level; that is,

expectations are formed rationally. The implication, of course, is that well-articulated policies can influence inflation expectations. To the extent that such policies are credible, they can reduce the inflation premiums built into interest rates and the adjustment costs that result when inflation rates change.

Although this article has examined a limited sample of available survey data, the recent discrepancy between expected and actual inflation is a matter of some concern. The fact that households have generally been unbiased in their predictions suggests that actual inflation will adjust to expected levels, rather than the other way around. Looking forward has, in this sense, been more reliable than looking backward.

#### ■ Footnotes

1. Hearing of the Economic Growth and Credit Formation Subcommittee of the House Banking, Finance, and Urban Affairs Committee, February 22, 1994.

2. See Michael F. Bryan and Stephen G. Cecchetti, "Measuring Core Inflation," Federal Reserve Bank of Cleveland, Working Paper No. 9304, August 1993. Although the authors describe a class of "limited information" measures, we consider a particular member of this class to illustrate a point.

3. See Edward Bryden and John B. Carlson, "On Disinflation since 1982: An Application of Change-Point Tests," Federal Reserve Bank of Cleveland, *Economic Review*, vol. 30, no. 1 (1994 Quarter 1), pp. 31-42.

4. Although Bryden and Carlson (footnote 3) report a subsequent reduction in core inflation around March 1992, the test indicates no break when the sample is extended to include the most recent data and is adjusted with revised seasonal factors.

5. See Michael F. Bryan and William T. Gavin, "Models of Inflation Expectations Formation: A Comparison of Household and Economist Forecasts," *Journal of Money, Credit, and Banking*, vol. 18, no. 4 (November 1986), pp. 539-44.

6. For a more extensive discussion of this conjecture, see Bryden and Carlson (footnote 3).

7. See Bryan and Gavin (footnote 5).

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*The views stated herein are those of the author and not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System.*

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