

# ECONOMIC COMMENTARY

Federal Reserve Bank of Cleveland

## The Indicator P-Star: Just What Does It Indicate?

by John B. Carlson

**F**inancial markets pay a great deal of attention to the Federal Reserve System and, in particular, to the deliberations of its key policymaking arm, the Federal Open Market Committee (FOMC). This "Fedwatching" focuses largely on anticipating how the FOMC is likely to react to unfolding events in the economy, and how such actions become translated into changes in the cost and availability of money and credit.

Specifically, markets are interested in knowing which variables the FOMC considers in assessing whether it is accomplishing its objectives. These variables are often referred to as indicators. In recent years, Federal Reserve officials have proposed a variety of new monetary indicators, including commodity prices, the trade-weighted value of the dollar, and the yield curve. Most recently, however, the Federal Reserve has unveiled P-Star ( $P^*$ ), an indicator of potential inflation.<sup>1</sup>

### ■ What Is an Indicator?

An indicator is neither an ultimate objective to be achieved (a goal), nor a stand-in objective to be aimed at (a target). Rather, an indicator is a variable that provides information about whether policy instrument settings are likely to accomplish their specified objectives, which are observed only after a lag. An indicator essentially

provides information concerning the current state of the economy.<sup>2</sup>

If an indicator value is unusually high (or low) on the basis of some historical standard, it could indicate that goal or target variables are likely to miss their marks. A policymaker might then reconsider policy instrument settings to attempt to avoid undesired outcomes. However, policymakers are under no commitment to react in any specified way to changes in the value of an indicator; nor are they committed to seek a specified value.

Because policymakers typically look at a variety of indicators, they often observe conflicting signals. Moreover, different policymakers give different weights to different indicators. Thus, it is often difficult to predict how a group of policymakers will react to substantial changes in indicator values.

### ■ What Is $P^*$ ?

Simply put,  $P^*$  is the eventual price level implied by the current level of the M2 monetary aggregate. It is calculated as  $P^* = (M2 \times V^*)/Q^*$ , where  $V^*$  is an estimate of the long-run value of the GNP velocity of M2—the mean value from 1955:Q1 to 1988:Q4—and  $Q^*$  is a Federal Reserve Board staff measure of potential output. Recent advances in understanding long-term statistical relationships indicate that  $P^*$

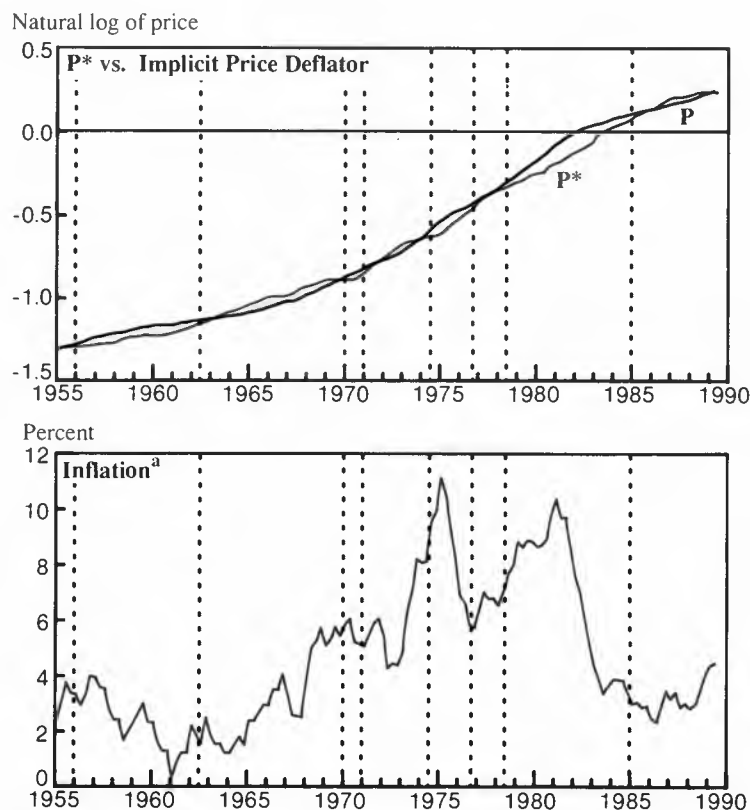
**Monetary indicators can help policymakers to evaluate the likely success or failure of policy instrument settings. The recently unveiled P-Star indicator can be useful as an indicator of potential inflation and, more broadly, as a method of assessing the Federal Reserve's long-term goal of price stability.**

and the current price level probably share a common trend.

The indicator property of  $P^*$  is revealed in figure 1. The vertical dotted lines denote the quarters when the current price level (implicit price deflator) and  $P^*$  cross (top panel). Periods after which  $P^*$  begins to persistently exceed the current price level are ultimately characterized by rising inflation (bottom panel).

Conversely, periods after which  $P^*$  begins to persistently remain below the current price level are followed by periods of disinflation. There is a noteworthy variation, however, in the lag between the time the two series cross and the point when inflation changes direction.

**FIGURE 1 P\* AS AN INDICATOR OF INFLATION**

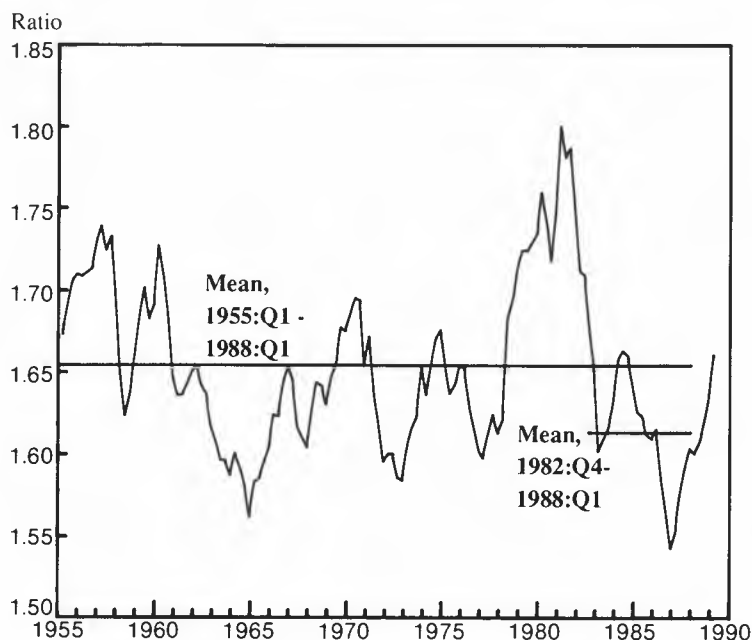


a. Inflation is the percentage change in the implicit price deflator from four quarters earlier.

NOTE: The vertical lines in the top and bottom panels mark the quarters when P and P\* cross.

SOURCES: Board of Governors of the Federal Reserve System; and U.S. Department of Commerce, Bureau of Economic Analysis.

**FIGURE 2 M2 VELOCITY**



SOURCES: Board of Governors of the Federal Reserve System; and U.S. Department of Commerce, Bureau of Economic Analysis.

Presently, the level of M2 appears approximately consistent with the current price level. In the first half of 1989, P\* fell slightly, so that P\* and the price level are about equal. Given the recent acceleration in M2 in early 1989:Q3 and current money-market interest rates, it is unlikely that P\* will continue to fall. Nevertheless, if P\* moves below the current price level and remains there persistently, then the inflation rate would be expected to fall.

**■ Isn't This Just the Quantity Theory?**

Economists will recognize P\* as a characterization of the quantity theory of money, which states that the level of the money supply ultimately determines the level of prices. Moreover, the P\* relationship implies that any particular trend in M2 will be associated with its own unique path for the long-run equilibrium price level.

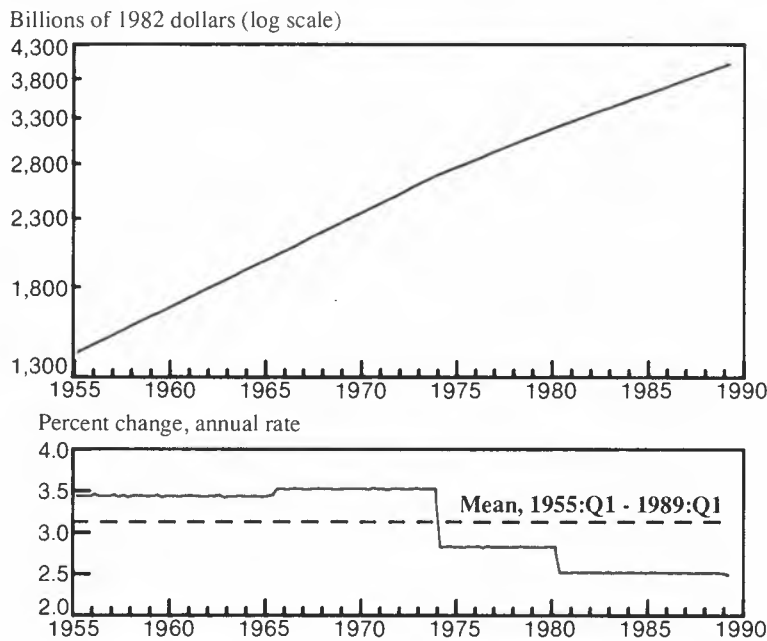
What distinguishes P\* from other characterizations of the quantity theory is the extent to which it is specified in practical terms, making it somewhat more applicable to real-world policies. For example, the choice of M2 as the measure of money is based on evidence that, over sufficiently long periods, M2 velocity returns to some mean value (see figure 2), and hence is independent of both economic factors and the money-supply level. Also, P\* is based on a particular estimate of the level of potential output, which is assumed to be independent of policy in the long run.

**■ Two Key Assumptions**

Specification of values for the long-run level of M2 velocity and for potential output is a matter of judgment. Some analysts have argued that it is unlikely that M2 velocity was not in some way affected permanently by deregulation in the early 1980s. They believe that deregulation removed constraints on banks, allowing them to compete more successfully for funds.

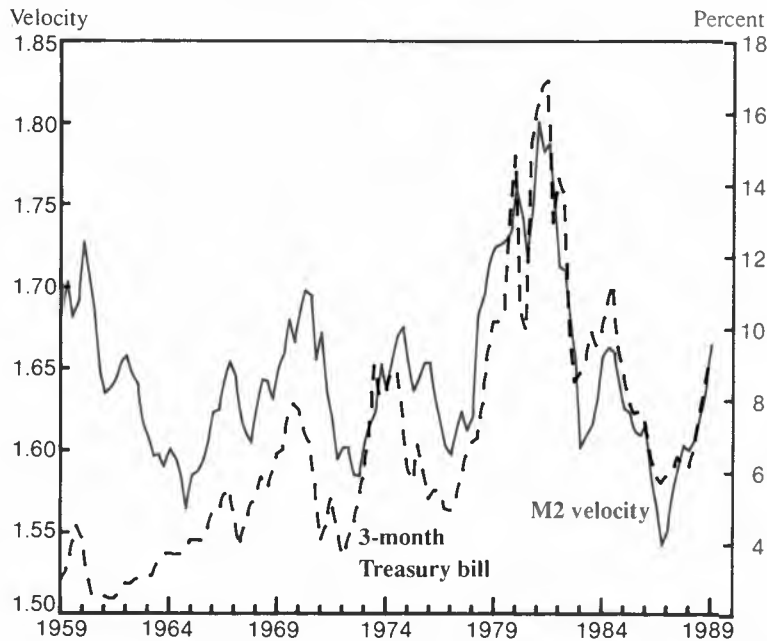
Consequently, one might expect that deregulation led to a portfolio shift of funds from nondepository instruments

**FIGURE 3 POTENTIAL OUTPUT**



SOURCE: Board of Governors of the Federal Reserve System.

**FIGURE 4 M2 VELOCITY AND INTEREST RATES**



SOURCE: Board of Governors of the Federal Reserve System.

(not counted as M2) to M2 instruments, including checking accounts and savings and time deposits. As evidence of such a shift, analysts point to the mean value of M2 velocity in the recent period from 1982:Q4 to 1988:Q4, which is somewhat below the longer-term average. If the lower

velocity estimate is more accurate, then any particular path for the eventual price level,  $P^*$ , would be compatible with a higher path for M2.

Similarly, some analysts question the measure of potential output used in calculating  $P^*$ . Figure 3 illustrates the dif-

ficulty in using such estimates. In terms of levels (top panel), it would appear that the measure of potential output grows rather smoothly. Expressing the measure in growth-rate terms (bottom panel), however, illustrates how the estimate of potential output growth has changed discretely at different times. These changes have been recognized only after the fact. There is currently no consensus on a method for assessing ex ante changes in trend output growth: at any time, an estimate of potential output may be inappropriate.

Despite these problems,  $P^*$  has some advantages over other inflation indicators. For example, because there are long and variable lags between money growth rates, it is difficult to find a simple measure of money growth that would reliably indicate the future inflation rate. Differing conclusions may result from choosing different periods over which to calculate money growth rates.  $P^*$ , on the other hand, provides an absolute reference point for the price level.

**■  $P^*$  as a Nominal Anchor**

It is useful to clarify the distinction between the short-run and long-run implications of  $P^*$ . By the nature of its construction,  $P^*$  indicates only the long-run equilibrium level of prices, not what the price level will be in any near-term month or quarter. Such an indicator is particularly useful in a framework within which to evaluate policies for achieving the Federal Reserve's long-term goal of price stability.

Often the focus of policy is concentrated on immediate real economic conditions. Policymakers naturally seek to avoid economic downturns. However, if policies do not take into account intermediate- and long-term consequences for the price level, even more severe policy restraint may be required later. Having a simple empirical guidepost like  $P^*$  could serve to anchor nominal spending, limiting its longer-term variability. This, in turn, could limit the potential for policy mistakes and hence the severity of the business cycle.

### ■ P\* in the Short Run

Identifying a simple long-term relationship between P\* and the price level is justified on empirical grounds because other variables, particularly nominal interest rates, do not seem to affect the long-term equilibrium value of M2 velocity. While interest rates trended upward over most of the postwar period, there is no clear evidence of any effect on the trend in M2 velocity. On the other hand, evidence strongly suggests that interest rates are important for identifying a short-run relationship between M2 and nominal GNP.

Recent research indicates that money demand may be more interest-rate sensitive than previously thought. Figure 4 reveals a close linkage between movements in interest rates and the velocity of M2. Thus, it would appear that interactions among money, nominal income, and interest rates matter in the short-run relationship between P\* and the price level.

Identification of a short-run relationship between P\* and the price level is further complicated by the problem that prices often adjust slowly to changing economic conditions. Although it is difficult to justify sluggish price adjustment on theoretical grounds, most economists find little evidence that prices of goods and services respond immediately to changes in monetary

policy. This seems evident in the fact that one of the best predictors of inflation is previous inflation. Including lagged inflation in models designed to predict inflation can be justified if lagged inflation is a reasonable proxy for inflationary expectations.

This characterization of the short-run inflation process is troubling because in any economic model with lagged effects, there is a potential for monetary policy changes to induce business cycles. Indeed, simple models linking changes in inflation to the difference between P\* and the price level—the price gap—indicate a significant potential for cyclical effects of monetary policy.<sup>3</sup> While there may be plausible economic models that do not display these cyclical effects of monetary policy, there is no sound basis for choosing among alternative models. Thus, it is difficult to know whether short-run inflation control based on the P\* indicator would lead to excessive economic volatility.

### ■ Conclusion

Recent public statements suggest that some Federal Reserve officials may have begun to use P\* as an indicator for clues concerning the achievement of the price-stability objective. Statistical evidence supports the view that P\* can be a useful indicator in this regard.

While P\* is not without some potential shortcomings, it is likely to be most useful in helping policymakers assess the longer-term consequences of policy actions. It is essential to maintain some longer perspective to avoid the possibility that short-term policy considerations might interfere with the longer-term goal of price stability.

### ■ Footnotes

1. A more complete description of P\* and the empirical research supporting the concept are found in Jeffrey J. Hallman, Richard D. Porter, and David H. Small, "M2 per Unit of Potential GNP as an Anchor for the Price Level," Staff Study No. 157, Board of Governors of the Federal Reserve System, April 1989.
2. This notion of an indicator and its distinction from targets and goals is discussed by Bennett T. McCallum in "Targets, Instruments, and Indicators of Monetary Policy," *Monetary Policy in an Era of Change*, Proceedings from the American Enterprise Institute's Conference of November 16-17, 1988.
3. See Hallman et al., op. cit.

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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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