

mittee chose a tentative target range of 3 to 7 percent for M2 last July.

While M2 seems to be durably related to nominal income over periods of 18 months or longer, its substantial sensitivity to interest-rate changes makes its usefulness as a short-run target questionable. M2's target ranges were widened in 1988, from 3 to 4 percentage points, to allow for the uncertainty about how interest rates may need to vary in response to unanticipated economic conditions. As the past several years have shown, the large short-run variability of M2 may be consistent with a steadily growing economy.

As Federal Reserve Chairman Alan Greenspan noted in his testimony before Congress in February 1988, one should not conclude that the Federal

Reserve is giving up on monetary targeting.<sup>5</sup> The FOMC will continue to interpret incoming information on the monetary aggregates in conjunction with other data on the performance of the economy to determine the best course for monetary policy. If the net result of policy actions is to substantially change the level of interest rates, however, the FOMC might be willing to tolerate M2 growth outside its specified ranges.

Finally, the difficulty posed by interest sensitivity of M2 is strictly a problem over the short run. The relationship between M2, prices, and income remains intact over the long run. Consequently, targets for M2 may prove to be especially useful in achieving the longer-term policy objective of price stability.

#### ■ Footnotes

1. See the *Federal Reserve Bulletin*, any recent issue, for definitions of these measures. Generally, M1 includes balances used in making transactions, while M2 includes M1 plus household savings assets.
2. In fact, even with the increased volatility in the 1980s, the velocity of M2 appears to be stationary around a constant mean level, although it may be more interest sensitive.
3. See Moore, George R., Richard D. Porter, and David H. Small, "Modeling the Disaggregated Demands for M2 and M1 in the 1980's: The U.S. Experience," a paper presented at the Federal Reserve Board Conference on Monetary Aggregates and Financial Sector Behavior in Interdependent Economies, May 1988.
4. For a thorough analysis of deposit-rate behavior see Moore et al.
5. Congressional testimony of Alan Greenspan, Chairman, Board of Governors of the Federal Reserve System; February 23, 1988; Monetary Policy Objectives for 1988.

*John B. Carlson is an economist at the Federal Reserve Bank of Cleveland. John N. McElravey is a research analyst at the Bank.*

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

BULK RATE  
U.S. Postage Paid  
Cleveland, OH  
Permit No. 385

Federal Reserve Bank of Cleveland  
Research Department  
P.O. Box 6387  
Cleveland, OH 44101

Material may be reprinted provided that the source is credited. Please send copies of reprinted materials to the editor.

#### Address Correction Requested:

Please send corrected mailing label to the Federal Reserve Bank of Cleveland, Research Department, P.O. Box 6387, Cleveland, OH 44101

## Money and Velocity in the 1980s

by John B. Carlson and  
John N. McElravey

Prior to 1980, a sharp slowdown in the money supply was expected to be associated with a downturn in economic activity. Indeed this concern was still expressed by some analysts in 1987 and 1988 as the growth rates of money supply measures M1 and M2 slowed precipitously.<sup>1</sup> Nevertheless, the economy has remained strong, despite the problems caused by the 1988 drought.

Recent evidence suggests that money growth is becoming more variable, reflecting increasing sensitivity of some bank deposits to changes in interest rates. In turn, this interest-rate sensitivity has affected the behavior of the velocity of money—the ratio of nominal income to money—and hence has affected the link between money and economic activity.

This *Economic Commentary* discusses how the newly emerging patterns in the velocities of M1 and M2 ultimately reflect the effects of financial deregulation and disinflation. Given the degree of the interest-rate sensitivity of money, and the uncertainty about how interest rates may need to vary in response to shocks to the economy, it has become difficult for policymakers to prespecify an appropriate growth rate for the nation's money supply over

the short run. This problem is also discussed.

#### ■ Velocity Trends

The relationship of money to nominal income was once thought to be one of the most stable relationships in economics. This was evident in the behavior of M1 velocity. From 1959 to 1980, M1 velocity grew smoothly along a 3-percent trend (see chart 1). While M1 velocity was systematically related to interest rates, the impact of interest-rate changes appeared relatively small.

In effect, a substantial slowdown in M1 growth during this period was usually associated with a slowdown in aggregate spending and, therefore, in economic activity. This tendency for changes in M1 growth to mirror changes in economic activity made it a useful guidepost for monetary policy. Indeed, the Federal Reserve increasingly relied on M1 as a gauge for monetary policy during the 1970s.

The apparent stability of the M1 velocity trend, however, was not inherent. During the current decade, M1 velocity has varied substantially with changes in interest rates (see chart 2). Moreover, while M1 velocity has declined since 1982, it is not evident that it is following any identifiable trend path. The case of M2 velocity is somewhat

The behavior of money has changed greatly in the 1980s. This article identifies the newly emerging patterns in money and its relationship to economic activity. These new patterns, largely a consequence of both deregulation and disinflation, reveal an increased sensitivity of money to interest rates. The implications for the role of money in the monetary policy process are also discussed.

different. It had a systematic relationship to interest rates in the short run before 1980, but was, and continues to be, relatively stable over long periods.<sup>2</sup>

#### ■ Opportunity Cost and the Aggregates

The substantial interest sensitivity of the monetary aggregates (M1, M2) and their velocities is being confirmed in studies of money demand.<sup>3</sup> In these studies, money demand is viewed as a function of its opportunity cost—the foregone interest income of holding lower-yielding money balances. As this cost of holding money rises, the demand for money falls (and velocity increases). The opportunity cost of a given deposit typically is measured by

the difference between the market interest rate on a relatively risk-free, short-term asset (such as the 3-month Treasury bill) and the rate paid on that deposit (its *own-rate*).

Prior to financial deregulation, beginning in the late 1970s, virtually all checkable deposits were noninterest bearing. Thus, the opportunity cost of M1 balances—comprised of currency and checkable deposits—was essentially equal to the Treasury-bill rate. Interest rates drifted upward over most of the postwar period. Rate levels at the trough of each recession were higher than at the previous trough (see chart 2). Money balances continually became more expensive to hold as interest rates and inflation rose. Economizing on money balances motivated individuals and businesses to find innovative ways to arrange portfolios and to execute transactions while keeping a minimum of checkable deposits.

Some innovations during the 1970s circumvented regulations on financial institutions. Interest-rate ceilings, for instance, kept banks from paying higher rates as market rates increased. New deposit-like instruments, such as money market mutual funds, were created to meet the demand of investors for higher yields on their funds, while maintaining their liquidity.

Also, cash management practices of businesses evolved as the rising opportunity cost made bank deposits less attractive relative to market instruments. Banks began to offer arrangements through which their corporate customers could conveniently purchase securities owned by the bank on an overnight basis and thereby earn market yields on funds otherwise held in noninterest-bearing deposits. The net effect of the evolution of these innovations and practices was that less and less money was held for the same amount of transactions and, by definition, velocity increased.

### ■ Disinflation and Financial Deregulation

Disinflation and financial deregulation greatly affected the opportunity cost of money and its velocity. Disinflation resulted in sharply falling interest rates, reversing the upward trend that dated back to the 1950s. Deregulation allowed banks to compete more effectively for funds by offering interest-bearing checking accounts and market rates of interest on saving and time deposits. The opportunity cost of most bank deposits fell markedly after 1982 when market rates fell and when banks priced deposits more competitively.

The combined impact perhaps was greatest on individual checking accounts. For these deposits, the opportunity cost fell from a high of 18 percent in 1980 to almost zero in 1986. Because banks can now price these deposits competitively, it would seem doubtful that their opportunity cost would ever soar as high as it did in the early 1980s. Moreover, the long-run, 3-percent growth trend in M1 velocity now appears to have been an artifact of secularly rising inflation and interest rates in a regulated environment. On the other hand, the long-run trendless nature of M2 velocity seems unaffected by the events of the 1980s.

What is curious is that, in the short run, most bank deposits appear more interest sensitive now than before deregulation. In principle, banks can, if they wish, alter most of their own deposit rates promptly in response to changes in market rates and thereby keep the opportunity cost of various deposits constant. With this kind of behavior, interest-rate changes should have less effect on aggregates of these deposits. This would seem especially likely for M2 because there are no interest ceilings on 83 percent of its deposits.

In fact, however, banks do not adjust all their deposit rates one-for-one with movements in market rates. Experience after deregulation indicates that repricing of some types of deposits is quite sluggish. Banks tend to raise rates on some deposits more slowly than on

others in response to rising market rates. For example, the own-rate on other checkable deposits (OCDs) rises more slowly because it increases a bank's cost of funds more than an increase in the own-rate on time deposits. This is because a change in the rates paid on OCDs affects all existing balances, whereas a change in the rates paid on time deposits affects only newly acquired deposits.<sup>4</sup>

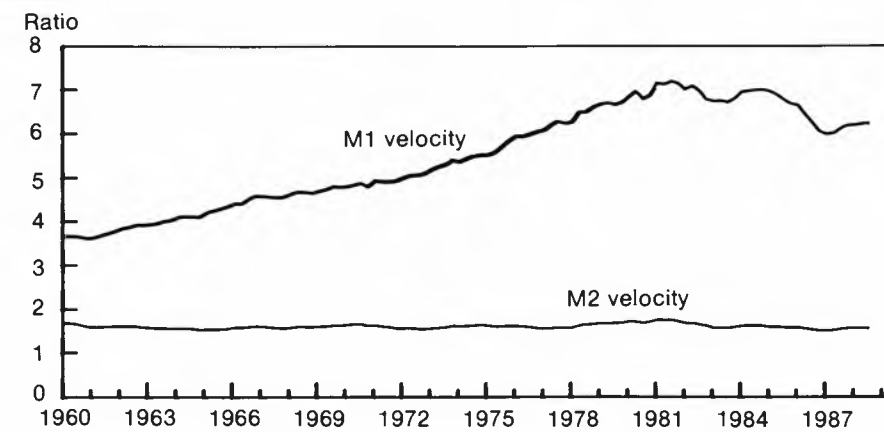
The net impact of these tactics is that bank deposits have become more interest sensitive. Some have speculated that this may reflect the increased sophistication of most deposit holders and the improved information and communications technologies that have made funds transfers more convenient. Even if opportunity costs were less affected by changes in interest rates now than before deregulation, deposit holders are much more conscious and aware of alternative assets. Thus, they are more likely to respond to changes in opportunity cost.

### ■ Recent Patterns

The opportunity cost of OCDs fell substantially with the decline in the Treasury-bill rate from 1984 until early 1987. The decline in opportunity cost spurred rapid growth in these accounts. As rates started rising in 1987, however, OCD growth dropped off sharply. Market rates declined after the stock-market crash, and OCDs surged during the first half of 1988. OCD growth moderated as short-term rates climbed in the second half of 1988. The own-rate on OCDs has not kept pace with the increase in market rates, so that the opportunity cost has again widened. The interest sensitivity of OCDs accounts for a large part of the post-1980 variability of M1 velocity.

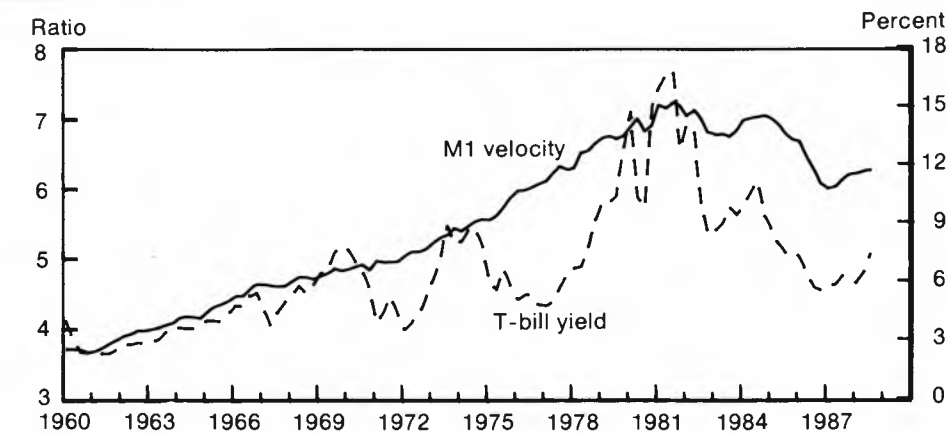
Own-rates on savings deposits and money market deposit accounts (MMDAs) in M2 also have been slow to adjust to changes in market rates, making their opportunity costs variable. The opportunity costs of OCDs, MMDAs, and savings deposits all have risen sharply during 1988. It seems likely that deposit holders would shift

CHART 1



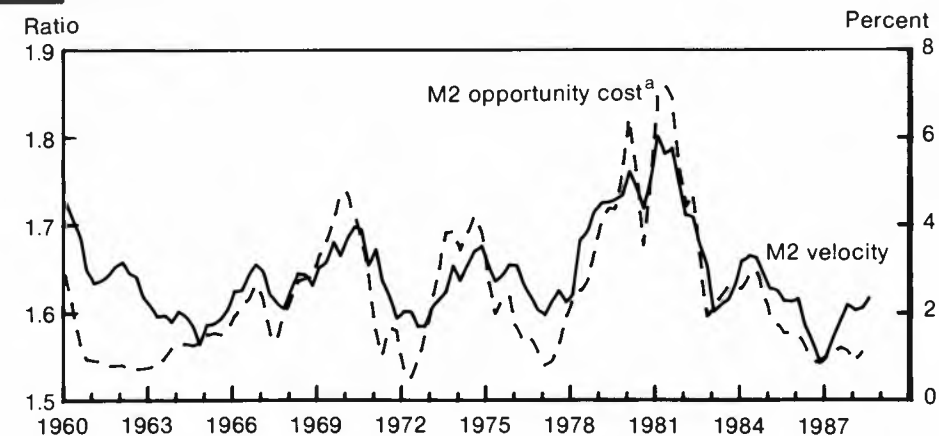
SOURCE: Board of Governors of the Federal Reserve System.

CHART 2



SOURCE: Board of Governors of the Federal Reserve System.

CHART 3



a. Two-quarter moving average.

SOURCE: Board of Governors of the Federal Reserve System.

out of these assets into more competitively priced instruments. These accounts, which comprise a large segment of M2, are responsible for much of the recent slowdown in M2 growth in the second half of 1988.

Rates paid on small time-deposits, also a large part of M2, have been more responsive to market rates, and their opportunity cost has varied less than that of the nontime deposits. As a consequence, small time-deposits have grown more rapidly than the others, though not enough to offset weakness in the other M2 components in the second half of 1988.

Reviewing the experience of the past three years provides a good example of how the portfolio effects of M2 opportunity cost work (see chart 3). Interest rates, opportunity cost, and inflation were approaching their lows in 1986. M2 grew at a rapid rate and, at the end of the year, its level was above the upper bound of the annual target range established for it by the Federal Reserve.

Although growth in the economy remained strong in 1987, M2 still fell substantially below the bottom of its annual target range because interest rates and opportunity cost rose, and inflation accelerated. Falling market interest rates after the stock-market crash spurred M2 growth to about 8 percent through June 1988. A series of policy tightening moves by the Federal Reserve during the spring and summer raised market rates, which led to M2 growth below the midpoint of its 1988 range by late in the year.

### ■ Policy Implications

As the traditional relationship between M1 and nominal income broke down, M1 became less useful in the monetary policy process. The Federal Reserve's Federal Open Market Committee (FOMC) dropped M1 from its reported objectives in 1987; M2 has received the most attention since then. In February, the FOMC chooses and reports its targets for M2 and other financial objectives for 1989. The Com-