Research Department
Federal Reserve
Bank of
San Francisco

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FRBSF Weekly Letter

Velocity and Monetary Policy in 1982

Every profession has rules-of-thumb to simplify highly complex relationships. In monetary economics, such a rule is that nominal GNP will, on average, grow about 3 percent faster than the money stock (defined as M1, which equals currency plus all checkable deposits). In fact, from 1960 to 1981, the average annual growth rate in GNP has been about 3 percent higher than the average annual growth rate in M1.

The rule can also be stated in terms of the velocity of M1. Velocity is the rate at which each dollar of money turns over in a given time period, usually one year. The money-income relationship restated would be that velocity has grown at a rate of about 3 percent a year.

While weekly M1 figures may be highly variable, it is widely recognized that the Federal Reserve can closely control the growth of M1 over the period of a year. Should the relationship between M1 and GNP remain stable, the Fed could presumably exert a strong influence on the growth rate of GNP. However, a major exception to the stable money-income relationship occurred in 1982. As shown in Chart 1, M1 grew at an average year-over-year rate of 6½ percent while nominal GNP grew by 4½ percent. Instead of rising by about 3 percentage points as past history would suggest, velocity actually fell by two percentage points. This has not happened since the 1930s and raises the major policy question: Can M1 continue to be used as a guide to policy in 1983 and beyond?

The answer to that question depends on the cause of the decline in velocity. If the decline was due to an unexpected shift in the demand for M1 (perhaps because of the unexpected severity of the recession), then M1 has at least temporarily lost its role as a primary guide to policy. If, however, 1982 can be explained by standard economic analysis, then the decline in M1 velocity, while unprecedented, should not necessarily affect its usefulness as a guide to policy.

This *Letter* makes the case for the latter proposition. In essence, we argue that the decline in inflation and inflation expectations that started in mid-1981 and continued through the end of 1982 should be expected to increase the demand for all financial assets, including M1. This would suggest that the velocity of all monetary aggregates (not just M1) would decline in 1982, which they did. The key point is that a decline in inflation expectations raises the quantity of M1 people wish to hold relative to any given level of income, changing the money-income relationship and causing velocity to fall.

Money demand

The public's demand for M1 is based on the level of income and the level of interest rates on competing assets. A rise in income will increase the quantity of M1 the public wishes to hold because it will engage in more transactions. A rise in interest rates will reduce the quantity of M1 the public wishes to hold, because securities would become more attractive than money. The relation between M1 on the one hand and income and interest rates on the other has been one of the most stable empirical relationships in economics. This means that the demand for money has been stable over time.

The one major exception to this stable demand for M1 occurred in about 1974-75 when there was a downward shift in the demand for M1 of about 10 percentage points. The actual level of M1 fell about 10 percentage points below that forecasted on the basis of the income and interest rates in those years. Subsequent analysis of that episode suggested that financial innovation in response to high rates of inflation created major incentives for the public (largely busi-

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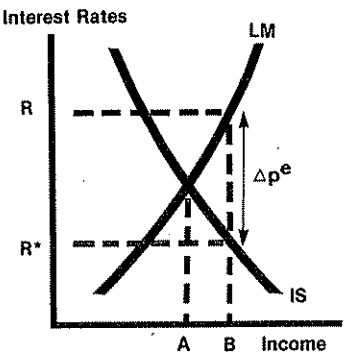
Figure 1



ness) to economize on M1. This called into question the use of M1 as a guide to policy.

The velocity decline in 1982 could plausibly be related to similar circumstances. High rates of inflation through 1981, inducing financial innovation and deregulation, could have changed the demand for M1 (especially for households). However, a close look at the evidence suggests this was not the case. First, financial innovation would, if anything, have reduced the demand for M1 and raised velocity as in 1974-75, but, in fact, velocity fell. Second, the actual growth in M1 in 1982 is about in line with forecasts from a money market model developed at the Federal Reserve Bank of San Francisco. Using this model, the one quarter ahead and full year (ex ante) forecasts of M1 in 1982 were relatively close to the actual growth rates of M1*. The results of this model imply that the demand for M1 was stable in 1982.

Stable demand for money means that the relationship between money on the one hand and interest rates and income on the other was stable. What then explains the dramatic decline in velocity, which is the relation between money and income? We will start with a brief theoretical explanation (which the non-technical reader may skip).

A technical digression

The standard way of explaining the money-income relation is by describing the equilibrium conditions in the money market and the goods market, shown in Figure 1. The supply and demand for money is summarized by what is called the LM (for liquidity/money) curve. The equilibrium conditions in the goods market are described by what is called the IS (for investment/savings) curve. The LM curve shows the different combinations of interest rates and income that will equate the supply and demand for money. The IS curve shows the combinations of interest rates and income that will equate investment and savings.

Simultaneous equilibrium in the goods and money markets is achieved where the LM curve intersects the IS curve. However, the relevant interest rate that equates supply and demand for money is the nominal or market interest rate (R), while the interest rate that equates investment and savings in the goods market is the real interest rate (R*) i.e., the nominal interest rate adjusted for expected inflation. Therefore, a "wedge" consisting of the expected inflation rate can separate the LM and IS curves.

For example, when market and real interest rates are the same (inflation expectations are zero), the equilibrium income in Figure 1 is at point A. When inflation expectations are positive, the equilibrium income will be at point B. As shown, with a positive inflation expectation of (Δp^e), income at point B clears the money market (LM) at a nominal interest rate (R) but clears the goods market (IS) at the real interest rate (R*).

If we assume that inflation expectations suddenly disppear, the inflation expectations wedge separating the LM and IS curves would also disappear and the nominal interest rate would equal the real interest rate. The equilibrium level of income would move from point B to point A and velocity would decline, that is, income would decline with no decline in money. The events of 1982 are consistent with this theoretical explanation in which a stable demand for money (staying on the LM curve) occurs with a decline in velocity.

What happened in 1982?

Starting in 1981 and continuing through December 1982, the year-over-year inflation rate declined from over 10 percent to 5 percent (see Chart 2). On the assumption that inflation expected over the next three to six months is closely related to the inflation actually experienced over the last year,

*For example, the mean absolute error (MAE) in one, two and three month ahead forecasts were 3.8, 2.1, and 1.7 percent, respectively. The full-year forecast error was a low 0.6 percent.

Chart 1
MONEY-INCOME RELATIONSHIP

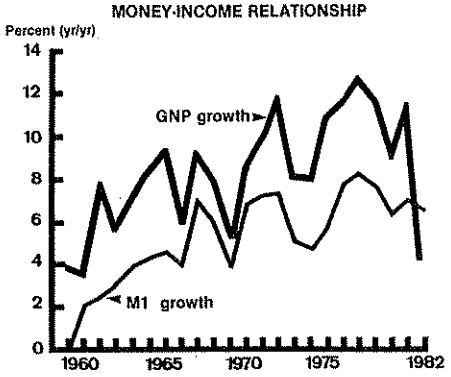
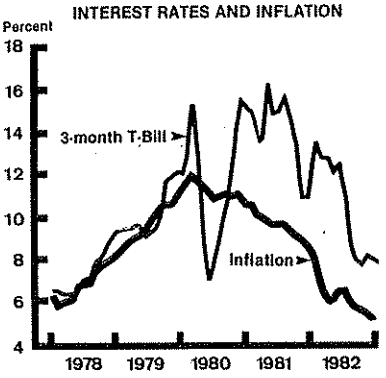


Chart 2
INTEREST RATES AND INFLATION



there has been a reduction in short-run inflation expectations of over 5 percentage points. Thus, the wedge between short-term market interest rates and short-run real interest rates should have been cut in half over the last year and a half.

Such a decline in inflation expectations should, by itself, lead to a decline in the velocity of M1. Such a velocity decline could occur in one of two ways. First, the decline in inflation expectations could be followed by a parallel decline in market interest rates of an equal amount with no effect on real interest rates or income. Such a decline in market interest rates would lead to an increase in the public's desire to hold M1-type balances. The San Francisco money market model suggests that a 5 percentage point decline in market interest rates (parallel with the 5 percentage point decline in inflation expectations) would increase by about 3 percentage points the quantity of M1 the public is willing to hold.

This greater willingness to hold M1 must be fully accommodated by an equal increase in the supply of money if interest rates are to fall by the full decline in inflation expectations. The increase in the stock of M1 would not stimulate an increase in income because there would be no decline in the real interest rate. Under this scenario, the decline in velocity would occur because M1 increased while GNP remained unchanged.

Second, if the money supply were not increased, then market interest rates would not fall in line with the decline in inflation expectations and real interest rates would rise. Higher real interest rates would imply greater incentives to save and reduced incentives to invest, and put downward pressure on income. In this case, velocity would fall because the level of nominal income had fallen while the quantity of money remained unchanged.

In the real world, both of these developments occurred. In the first half of 1982, monetary policy was conducted in such a way as to keep the growth in M1 at a relatively low 5.7 percent. As a result, short-term market interest rates (measured by three-month Treasury bills) averaged 12½ percent, while the inflation rate declined. The resulting rise in the real interest rate led to a slower than expected growth in income, especially in the second half of 1982. Starting in July, however, market interest rates fell substantially, such that three-month Treasury bills averaged 8 percent in the period from September to December 1982. This 4½ percent decline in the Treasury bill rate was approximately in line with the decline in inflation. The result was an 11.3 percent rise in M1 in the second half of 1982 to a level approximately 3 percentage points above the top of the Federal Reserve's 5½ percent target range by the fourth quarter. The San Francisco money market model forecast the low first half M1 growth with a 0.5 percent error and the rapid second half M1 growth with a 0.9 percent error.

Conclusion

Put simply, a major decline in the inflation rate will, on balance, raise the amount of money the public is willing to hold at any level of income. As a result, the velocity of money—the ratio (GNP/M1)—must fall. If the supply of money were not increased, the decline in velocity would be induced by a fall in GNP.

On this basis, the rapid growth of M1 in the second half of 1982 was an appropriate response to the decline in inflation expectations. How long this rapid M1 growth rate should continue is a matter of judgment. In principle, however, M1 growth should not exceed the increased desire to hold M1 as a result of the decline in inflation expectations. Detailed empirical estimates of the exact magnitude of that level of adjustment in M1 will vary. But, if the inflation rate in 1983 does not drop significantly below the 5 percent inflation of 1982, then velocity should resume a more normal pattern and M1 begin to grow at a more normal rate some time during 1983.

Michael W. Keran

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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT

(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 3/2/83	Change from 2/23/83	Change from year ago Dollar	Change from year ago Percent
Loans (gross, adjusted) and investments*	164,231	1,186	6,333	4.0
Loans (gross, adjusted) — total#	142,690	1,033	6,120	4.5
Commercial and industrial	45,294	366	3,199	7.6
Real estate	57,276	− 91	510	0.9
Loans to individuals	23,586	0	317	1.4
Securities loans	2,641	391	459	21.0
U.S. Treasury securities*	7,936	335	1,697	27.2
Other securities*	13,603	− 182	− 1,484	− 9.8
Demand deposits — total#	41,684	2,235	1,489	3.7
Demand deposits — adjusted	28,334	2,043	1,906	7.2
Savings deposits — total	63,869	1,043	33,078	107.4
Time deposits — total#	70,177	−1,341	− 22,228	− 24.7
Individuals, part. & corp.	62,159	−1,026	− 20,431	− 24.7
(Large negotiable CD's)	22,975	− 753	− 12,929	− 36.0

Weekly Averages of Daily Figures	Week ended 3/2/83	Week ended 2/23/83	Comparable year-ago period
Member Bank Reserve Position			
Excess Reserves (+)/Deficiency (−)	163	20	100
Borrowings	81	3	14
Net free reserves (+)/Net borrowed(−)	82	17	86

* Excludes trading account securities.

Includes items not shown separately.

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