

FRBSF WEEKLY LETTER

Number 91-33, September 27, 1991

M2 and the Business Cycle

The role of the monetary aggregates as indicators or targets of monetary policy has waxed and waned over the past fifteen years. Emphasis on monetary targeting reached a high in 1979-1982, when the Federal Reserve explicitly targeted M1 in implementing its anti-inflation policies. After that, the aggregates were de-emphasized, based largely on the view that deregulation of the financial system had rendered the relationship between money and the economy unreliable, at least for an extended transition period.

In the past few years, interest in the aggregates, especially M2, has resurged. Two factors seem to have led to this development. First, recognition has grown that deregulation may not have interfered with the stable *long-run* relationship between M2 and total spending on goods and services (and thus with the price level). Second, the slow growth in M2 that preceded this recession has led some to argue that the Fed should have paid more attention to that signal.

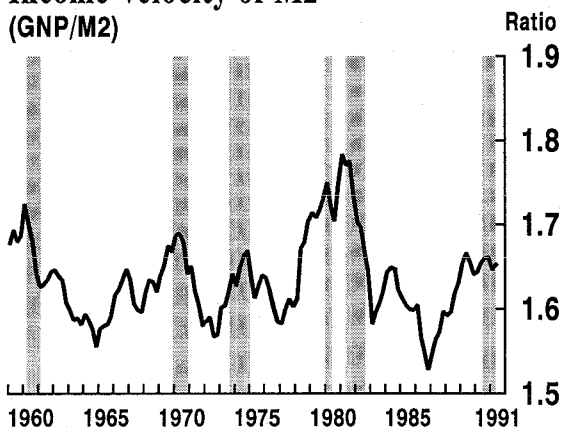
In this *Letter*, we review the evidence on the reliability of M2 as a guide for monetary policy in general, and then assess the implications of the recent slowdown in M2 for future economic activity.

In the long run. . .

Is the relation between M2 and nominal GNP (that is, total spending on goods and services) stable in the long run? Chart 1 shows the velocity of M2 (referred to here as V_2) over the past 30 years. V_2 is measured as the ratio of nominal GNP to M2, and thus indicates how many times in a year a given stock of M2 is spent and re-spent on goods and services. As the Chart shows, V_2 fluctuates widely in the short run, but in the long run, the series exhibits a stable trend, always returning to a constant level since the late 1950s. This suggests a stable long-run relationship between the *levels* of M2 and nominal GNP; specifically, the stock of M2 tends to be spent and re-spent about 1.64 times per year on goods and services. Statistical analyses (technically called cointegration tests) confirm this conclusion, and suggest that over the post-war

period M2 has led GNP on average. These tests also suggest that the other monetary aggregates (M1, M1A, and M3) have *not* had such stable long-run relationships (Miller, 1991).

Chart 1
Income Velocity of M2
(GNP/M2)



What do these results mean for monetary policy? They suggest that if the central bank knows the average level of M2 over a long period of time, it can predict nominal GNP over the same period fairly accurately. How long a period is required for this relationship to hold? Empirical estimates suggest that nominal GNP adjusts to a new level of M2 with very long lags. In fact, it appears to take around 4½ years for one-half of this adjustment to be completed.

Moreover, over periods this long, adjustment of nominal GNP translates into adjustment of the price level. In the long run, the level of output produced by the economy is determined by underlying supply conditions (such as the labor force and productivity) and is unrelated to M2. Thus the influence of M2 on nominal GNP translates fully into an influence on the aggregate price level.

In sum, the fact the V_2 is stable in the long run means that persistent, excessive M2 growth will lead to excessive inflation. Or, put more positively,

FRBSF

if monetary policy keeps M2 growth under control over a period of several years, it simultaneously would keep inflation under control.

In the short run. . .

The wide fluctuations in V2 around its average level (Chart 1) show that there is no simple relationship between money and output, so M2 is a much less useful indicator of economic activity in the short run. Some of these fluctuations can be explained by the effects of interest rates and the lags in the response of GNP to money. For example, as market interest rates rise relative to those paid on M2 accounts, people economize on their holdings of M2 and its velocity increases. However, even after accounting for interest rate spreads and lagged responses, large errors remain in explaining V2.

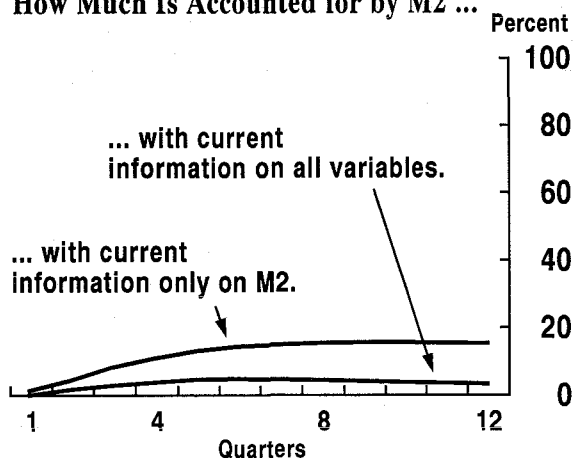
In order to be more precise about the usefulness of M2 as a short-run, or cyclical indicator, we estimated a model of M2, prices, real GNP, and a market interest rate that incorporates the short-run relationships among changes in these variables, as well as the long-run relationships among their levels. This model (called a vector-error-correction model) is similar to the one estimated by Miller (1991). It is used to estimate the relative importance of M2 impulses to the short-run behavior of real GNP. (An M2 impulse can be thought of as an unexpected one-time movement in M2 growth.)

We asked two questions of this model. First, what does M2 tell us about future movements in real GNP if we have information about contemporaneous interest rates, prices, and real GNP? The answer is: Not much. As shown in Chart 2, M2 impulses historically have accounted for a very small percentage of the total uncertainty (prediction error) in real GNP in our model. In other words, M2 does not contain much additional information about future real GNP over and above that contained in contemporaneous interest rates, prices, and real GNP.

The second question is, what does M2 tell us about real GNP when information on M2 is all we have? The answer is: A little more, but still not a lot. In this case, unexpected movements in M2 account for no more than about 16 percent of the overall uncertainty in real GNP. Thus, even if the "deck is stacked" in favor of a role for M2, the

effect of an M2 impulse on output easily could be swamped by the effects of other factors.

Chart 2
Real GNP Forecast Error:
How Much Is Accounted for by M2 ...



In the current cycle. . .

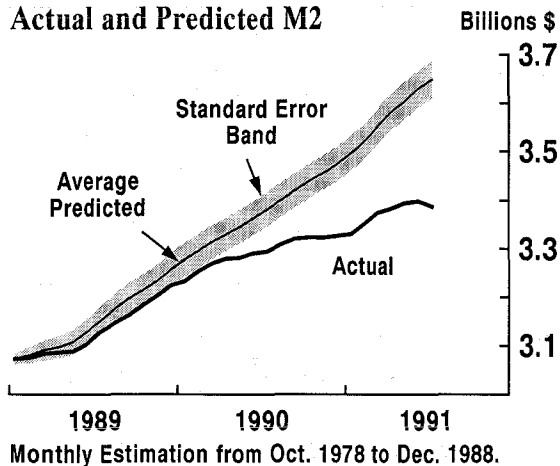
The analysis so far applies to the long-run and short-run relationships observed **on average** over the past 30 years. Undoubtedly, business cycles differ, and M2 is more important in determining real GNP in some cycles than in others. Is it likely that M2 is having a larger than average effect on economic activity in this cycle? Does the decline in M2 in recent months threaten to abort the business cycle recovery?

To answer these questions, we consider the possible sources of the recent decline in M2, and what they may imply for real GNP in the future. First, the weakness in M2 is not entirely explained by past and current movements in output, prices, and interest rates. Over the past several quarters, M2 has been well below the level predicted based upon its historical relationship with these other variables (see Chart 3). M2 moved outside the error band early last year, and since then the gap has widened. There is only a 5 percent chance that M2 would have fallen outside the error band if the historical relationship were still in place. This suggests that unusual factors most likely have accounted for the weakness in M2.

Two categories of explanations have been put forth. First, the decline in M2 could reflect a portfolio shift into other assets. For example, the

yield curve has steepened recently, meaning that rates of return on longer-term assets have risen relative to those on the comparatively short-term assets in M2. This may be why funds invested in stock and bond mutual funds have risen sharply while M2 has declined. It is generally agreed that such portfolio shifting should have little or no implication for future economic activity, and would therefore not call for a monetary policy response.

Chart 3
Actual and Predicted M2



The second category, which has received the most attention, has to do with the role of reduced credit availability in determining M2 and economic activity: in other words, the so-called "credit crunch." It has been argued that credit availability has been restricted by the downsizing of the thrift industry, tougher capital standards for

banks, and other factors, and that reduced credit has restricted both M2 and economic activity.

However, this view suggests that M2 may not be playing an independent role in the current business cycle. In other words, whether or not weak M2 is likely to precede weakness in the economy may depend more on whether or not these is a credit crunch than on the behavior of M2 itself.

In summary, M2 has not been a very reliable or significant cyclical indicator in the past. It is possible that its correlation with economic activity has been strengthened in the present cycle by a credit crunch. However, to the extent that this is the case, the real issues have to do with developments in the credit markets, not necessarily with M2.

The role of a credit crunch in the recent recession is an open issue, which will be discussed in a future *Letter*.

Frederick T. Furlong
Research Officer

John P. Judd
Vice President and
Associate Director
of Research

Reference

Miller, Stephen J. 1991. "Monetary Dynamics: An Application of Cointegration and Error-Correction Modeling." *Journal of Money, Credit and Banking* (May) pp. 139-154.

REMINDER

If you missed the August 15 deadline to continue your free subscription, please send us your address label (with corrections) by October 1.

Opinions expressed in this newsletter do not necessarily reflect the views of the management of the Federal Reserve Bank of San Francisco, or of the Board of Governors of the Federal Reserve System.

Editorial comments may be addressed to the editor (Judith Goff) or to the author. . . . Free copies of Federal Reserve publications can be obtained from the Public Information Department, Federal Reserve Bank of San Francisco, P.O. Box 7702, San Francisco 94120. Phone (415) 974-2246.

Research Department
Federal Reserve
Bank of
San Francisco

P.O. Box 7702
San Francisco, CA 94120

Index to Recent Issues of *FRBSF Weekly Letter*

DATE	NUMBER	TITLE	AUTHOR
3/22	(91-12)	Inflation and Economic Instability in China	Cheng
3/29	(91-13)	Banking and Commerce: The Japanese Case	Kim
4/5	(91-14)	Probability of Recession	Huh
4/12	(91-15)	Depositor Discipline and Bank Runs	Neuberger
4/19	(91-16)	European Monetary Union: Costs and Benefits	Glick
4/26	(91-17)	Record Earnings, But...	Zimmerman
5/3	(91-18)	The Credit Crunch and The Real Bills Doctrine	Walsh
5/10	(91-19)	Changing the \$100,000 Deposit Insurance Limit	Levonian/Cheng
5/17	(91-20)	Recession and the West	Cromwell
5/24	(91-21)	Financial Constraints and Bank Credit	Furlong
5/31	(91-22)	Ending Inflation	Judd/Motley
6/7	(91-23)	Using Consumption to Forecast Income	Trehan
6/14	91-24	Free Trade with Mexico?	Moreno
7/5	91-25	Is the Prime Rate Too High?	Furlong
7/19	91-26	Consumer Confidence and the Outlook for Consumer Spending	Throop
7/26	91-27	Real Estate Loan Problems in the West	Zimmerman
8/16	91-28	Aerospace Downturn	Sherwood-Call
8/30	91-29	Public Preferences and Inflation	Walsh
9/6	91-30	Bank Branching and Portfolio Diversification	Laderman/Schmidt/ Zimmerman
9/13	91-31	The Gulf War and the U.S. Economy	Throop
9/20	91-32	The Negative Effects of Lender Liability	Hermalin

The *FRBSF Weekly Letter* appears on an abbreviated schedule in June, July, August, and December.