FRBSF WEEKLY LETTER

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Signals from M1 and M2

The robustness of M1 with respect to its target range since the end of 1984 when M2 has been more or less in line with its target raises some questions about the reliability of M1 as a guide to monetary policy. A change in the behavior of M1 (from what past experience would lead us to expect) would make it difficult to interpret what fluctuations in M1 imply about the economy and, consequently, impair its usefulness for monetary policy. In this *Letter* we argue that such a judgment against M1 is premature.

Behavior

The money supply, as measured by M1, surged late last year and continued to grow rapidly in the first half of 1985. From its average level in the fourth quarter of 1984 through June 1985, M1 grew at about an 11½ percent annual rate. At that pace, M1 — which includes currency, demand deposits, NOW and Super NOW account balances, and travelers' checks — easily outstripped the upper bound of the 4 to 7 percent target range originally adopted for it in February 1985 (see Chart 1). With M1 so far above its original target and signs of sluggishness in the economy, the Federal Open Market Committee changed the target for M1 to a 3 to 8 percent range (not shown in the chart) in its mid-year review of the aggregates. The Committee also set the base for the target equal to the average value of M1 for the second quarter of 1985 (instead of the fourth quarter of 1984).

In contrast to M1, the broader measure of money, M2, grew at about a 9¼ percent annual rate from the fourth quarter of 1984 to June 1985. As a result, M2 was only slightly above the upper bound of its 6 to 9 percent target range depicted by the cone in Chart 2. With M2 apparently behaving well, the Committee left the range for this monetary aggregate unchanged.

Questioning M1

The usefulness of M1 as a guide to policy is not questioned merely because it has grown rapidly. Strong growth in M1 at any time may simply reflect sizeable changes in the economic variables, such as income and interest rates, that are assumed to influence the behavior of M1. On this score, it can be noted that the six-month commercial paper rate was approximately 400 basis points lower at the end of July 1985 than in mid-August 1984. Since money holders will tend to keep higher balances with lower open market interest rates, such a large drop in rates would be expected to lead to an expansion of money.

The usefulness of M1 derives from its having a stable relationship with other economic variables. This stability has come into question in recent years because of financial innovation and deregulation in general and the introduction of NOW accounts in particular.

One argument holds that these developments have tended to magnify the response of the demand for M1 to changes in market interest rates. There are a number of channels through which this could happen. For example, the payment of interest on NOW accounts reduces the opportunity cost of holding money. (The opportunity cost is the difference between the return from holding money and the return from holding an alternative asset). With a lower opportunity cost on NOWs, M1 will be more attractive as a vehicle for holding savings balances. Because these balances typically are considered more interest-sensitive than deposits traditionally held in M1, they would be expected to raise the response of M1 to changes in interest rates.

Notice also that the payment of a fixed rate of interest on NOWs means that the relative change in the opportunity cost on these accounts is greater for a given change in market interest rates than demand deposits, which do not pay explicit interest. For instance, if market rates rose from 10 percent to 11 percent, the change relative to the original opportunity cost of holding NOW accounts would be slightly more than 20 percent, while the same change for demand deposits would be 10 percent. Thus, to the extent that the demand for money depends upon the relative change in the opportunity cost, NOW accounts, and thus M1, will show a stronger response to changes in market interest rates than comparable household demand deposits.

M1 reliability

While the potential for financial innovation and de-posit deregulation to distort M1 clearly exists, there remains the question of whether the actual impact has been large enough to change the usefulness of M1 as a guide to policy. To answer this second question, we used the Federal Reserve Bank of San Francisco's Monthly Money Market Model. The model was estimated with data from 1976 to 1983. The purpose of this estimation was to derive the relationship that prevailed between M1 and its determinants (which, in this model, consist of income, interest rates and changes in bank loans) over that period. We then used this estimated relationship to compute values for M1 over the period from November 1984 to June 1985 given the actual values of its determinants.

The estimated values of M1 obtained from this exercise provide a straightforward way of ascer-taining whether the relationship between M1 and its determinants has changed since the beginning of 1984. If this relationship has changed then the estimated (or simulated) values should be system-atically different from the actual values of M1 over the same period.

Chart 1 depicts the simulated series as a dashed line labeled Simulation A. The dashed line shows that the Monthly Money Market Model predicted virtually all the rapid rise in the M1 aggregate from November 1984 to May 1985. The model did under-predict M1 growth in June 1985. In that month, M1 grew at an unusually rapid 20 percent annual rate.

Some change in M1

The simulation results described above provide evidence that the relationship between M1 and its determinants has not changed significantly since the end of 1983. However, it is possible that a change did occur somewhat earlier, especially with the nationwide introduction of NOW accounts. To investigate this possibility, we estimated the Money Market Model over the period 1976 to 1980. The relationship obtained from this estima-tion was then used to simulate M1 in a manner similar to the first simulation.

This second simulation is shown in Chart 1 as a dotted line labeled Simulation B. The model does not predict all of the expansion in M1 between November 1984 and June 1985. It is important to

note that these predicted values of M1 based on the relationships before deregulation lie above the upper bound of the original 4 to 7 percent target cone for M1 for 1985.

The under-prediction of M1 in the second simula-tion is consistent with the view that the response of M1 to its determinants has changed somewhat since 1980. However, the fact that the first simula-tion (where the model was estimated through 1983) tracks M1 closely through the first half of 1985 suggests that the change in structure is "small enough" in the sense that the relationship esti-mated across the break can still incorporate enough of the change to allow successful prediction.

What about M2?

Given that M1 has grown so fast relative to its targets, it is only natural that considerable atten-tion would be given to explaining its behavior. Likewise, with M2 relatively well-behaved, it would hardly seem necessary to explain why it is so much closer to its target. Nevertheless, under-standing why M2 is close to its target is essential to evaluating whether that aggregate is indeed signal-ling anything different from what M1 is signalling for monetary policy.

In comparing the behavior of M1 and M2 relative to their respective targets, it is also necessary to look at how the targets have changed. The M2 target for 1985 was the same as that for 1984 — 6-9 percent. In contrast, the top of the target range for M1 was one percent lower in 1985 than it was in 1984 — the M1 range was 4-8 percent in 1984 and 4-7 percent in 1985. Our point is that if the top of the M2 target range also had been reduced by one percentage point in 1985, M2 would have been noticeably above its target range in June as well.

The second point involving M2 is that, like M1, it has undergone changes as a result of deposit deregulation and financial innovation. These changes likely have altered its relationship to the economic variables that influence its behavior. For example, over the past several years, a growing proportion of the components within M2 have come to carry yields that vary with market interest rates. These flexible yields mean that, over the long-run at least, a large fraction of M2 may not be responsive to changes in market interest rates. The

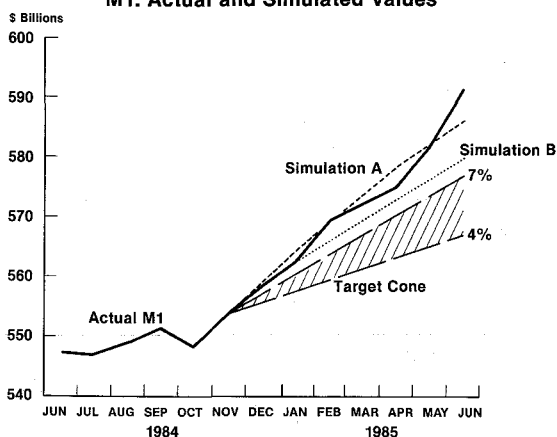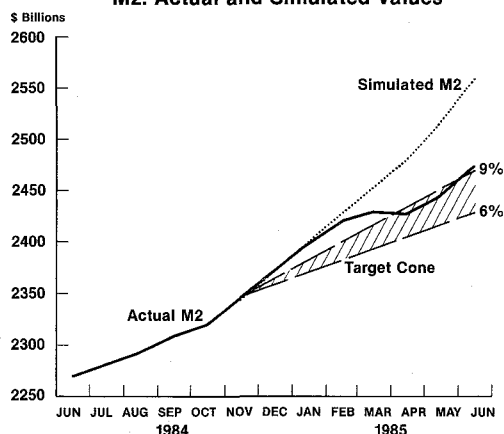**Chart 1**
M1: Actual and Simulated Values

Chart 2
M2: Actual and Simulated Values

presence of such a relationship between interest rates and a significant portion of M2 could lead to a sharp divergence in the growth of M1 and M2 during a period marked by a large change in interest rates, with M1 showing a much stronger response.

Simulating M2
To illustrate how the behavior of M2 has recently changed, we simulated M2 using estimated pre-deregulation relationships. For this purpose, an M2 equation was estimated over the period 1970 up to 1979 — the first full year of the six-month money market certificate. (That account had a $10,000 minimum denomination and a yield based on the six-month Treasury bill rate.) In the equation, the explanatory variables were contemporaneous and lagged values of personal income and the six-month commercial paper rate, and lagged values of M2.

The dotted line in Chart 2 shows that the predicted values for M2 began to diverge from those of actual M2 in the early part of 1985. From March on, the difference between the predicted series and actual M2 grows increasingly larger. By June 1985, the simulated series based on pre-deregulation relationships over-predicts M2 by a wide margin. Moreover, the simulated M2 is substantially above its target cone.

These results are consistent with the view that the responsiveness of M2 to changes in market rates has decreased significantly since deregulation began. Thus, even if there had been no change in

the responsiveness of M1 to interest rates due to deregulation, the relative behavior of M1 and M2 would have been noticeably different from what past experience would lead us to believe.

Summing up
In this *Letter* we have examined the behavior of M1 and M2 with respect to their target ranges over the first half of 1985. The intent was to examine whether the apparent differences in this behavior gave conflicting signals about policy. The empirical evidence presented above indicates that M1 and M2 are not sending contradictory messages.

The *apparent* disparity in their behavior comes from two sources. First, deposit deregulation appears to have affected the two aggregates in opposite directions. The empirical evidence indicates that M2 has become less sensitive to interest rate changes, which explains its relatively low response to the decrease in interest rates since mid-August 1984. For M1, the empirical evidence indicates an increase in its sensitivity to interest rates, although it appears that this was not a large increase.

Second, the apparent difference between the behavior of the two aggregates becomes exaggerated when the original target ranges established in February 1985 are used as a frame of reference. As mentioned above, the range for M2 was left unchanged (compared to its range over 1984), whereas the top of the target range for M1 was lowered by one percentage point.

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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT
(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 8/28/85	Change from 8/21/85	Change from 8/29/84 Dollar	Percent[7]
Loans, Leases and Investments[1] [2]	192,992	484	11,370	6.2
Loans and Leases[1] [6]	174,582	576	11,899	7.3
Commercial and Industrial	50,879	332	1,561	3.1
Real estate	64,195	− 33	3,308	5.4
Loans to Individuals	35,559	191	6,055	20.5
Leases	5,434	8	396	7.8
U.S. Treasury and Agency Securities[2]	11,324	− 177	− 588	− 4.9
Other Securities[2]	7,086	85	59	0.8
Total Deposits	196,672	− 44	9,150	4.8
Demand Deposits	45,753	− 3	3,176	7.4
Demand Deposits Adjusted[3]	31,251	196	3,026	10.7
Other Transaction Balances[4]	13,575	− 62	1,549	12.8
Total Non-Transaction Balances[6]	137,344	22	4,424	3.3
Money Market Deposit Accounts—Total	45,104	51	7,374	19.5
Time Deposits in Amounts of $100,000 or more	38,152	48	− 3,200	− 7.7
Other Liabilities for Borrowed Money[5]	22,612	471	2,195	10.7

Two Week Averages of Daily Figures	Period ended 8/26/85	Period ended 8/12/85	
Reserve Position, All Reporting Banks			
Excess Reserves (+)/Deficiency (−)	91	12	
Borrowings	25	59	
Net free reserves (+)/Net borrowed(−)	66	− 46	

[1] Includes loss reserves, unearned income, excludes interbank loans
[2] Excludes trading account securities
[3] Excludes U.S. government and depository institution deposits and cash items
[4] ATS, NOW, Super NOW and savings accounts with telephone transfers
[5] Includes borrowing via FRB, TT&L notes, Fed Funds, RPs and other sources
[6] Includes items not shown separately
[7] Annualized percent change