Much Ado About M2

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SINCE the observed growth rates of the monetary aggregates, M1B and M2, often diverge, monetary policymakers, their advisors and "Fed watchers" naturally question which aggregate is a better measure on which to focus in conducting monetary policy.[1] The growth rates of these two aggregates recently have diverged. More specifically, M1B growth has tended to fall short of the growth range set by the Federal Reserve Board (6 percent - 8½ percent), while the growth of M2 tended to exceed its targeted range (6 percent - 9 percent).

This article will provide some direction to the perennial debate about the monetary aggregates. The evidence in this article indicates that the growth of M1B is influenced relatively less by nonpolicy activity — that is, it is easier to control — than M2, and that the growth of M1B better explains variations in the pace of economic activity than M2.

M1B AND M2: DEFINITIONS

Table 1 presents the current M1B and M2 definitions.[2] The M1B measure is essentially the old M1 aggregate, except that it *excludes* demand deposits due to foreign banks and official institutions and *includes* various interest-bearing transactions accounts. These latter accounts comprise negotiable order of withdrawal (NOW), automatic transfer from savings (ATS) and credit union share draft accounts. In the second quarter of 1981, for example, these interest-bearing deposits accounted for about 16 percent of total M1B, the remainder being currency, coin and demand deposits. The M1B measure is commonly considered a *transactions* definition of money because each of its components is used primarily as a means of payment.

The M2 measure is much broader than M1B. It encompasses, in addition to M1B, an array of financial items not generally employed as a means of payment, such as savings deposits and small time deposits (issued in denominations less than $100,000). M2 also incorporates deposits that have not yet been categorized as either purely transactions deposits or nontransactions deposits. These assets include overnight repurchase agreements (RPs) issued by commercial banks, overnight Euro-

Table 1
The New Monetary Aggregates

Component	M1B	M2
Currency in circulation	X	X
Demand deposits at commercial banks and thrift institutions, excluding deposits due to foreign commercial banks and official institutions	X	X
NOW, ATS and credit union share draft accounts	X	X
Overnight RPs		X
Savings deposits at commercial banks and thrift institutions		X
Small time deposits (less than $100,000) at commercial banks and thrift institutions		X
Overnight Eurodollar deposits issued by Caribbean branches of member banks and held by U.S. nonbank residents		X
Money market mutual fund shares		X

[1]Uncertainty about which monetary aggregate to use in formulating monetary policy can be found in the "Record of Policy Actions of the FOMC" throughout the past year. For example: "In light of the relatively strong growth of M-2 and M-3 and the substantial easing recently in money market conditions, as well as uncertainties about the interpretation of the behavior of M-1, the Committee on Febraury 24 agreed to accept some shortfall in growth of M-1A and M-1B from the specified rates. . . " *Federal Reserve Bulletin* (April 1981), p. 318.

Questions about which aggregate to choose also have appeared in the popular press. See "Bad News Markets," "M-Fun" and Irving Kristol, "The Trouble with Money," each appearing in the *Wall Street Journal*, August 26, 1981. See also Robert Haney Scott, "If Fed is to Control Money, It Must Control All Money," *American Banker*, August 26, 1981.

[2]M1B data unadjusted for NOW account shifts are used exclusively throughout this article. For further discussion of the new definitions, see R. W. Hafer, "The New Monetary Aggregates," this *Review* (February 1980), pp. 25-32.

dollars issued by Caribbean branches of member banks to U.S. nonbank customers, and money market mutual fund shares (MMMFs). These accounts as of July 1981 accounted for about 10 percent of total M2.

The non-M1B component of M2 is viewed as a close substitute for other nontransactions financial assets. MMMFs, for example, are often viewed as a nontransactions component, even though shareholders commonly have check-writing privileges. This feature has prompted questions about substituting MMMFs for transactions accounts, even though their "liquidity characteristics are most like those of savings accounts."[3] Two points weaken the claim that MMMFs are close substitutes for transactions deposits. First, there are relatively large minimum denomination requirements (usually $500 or more) for checks written against these accounts. Second, checks written on these accounts must clear through already existing transactions accounts. Consequently, that portion of MMMFs used for transactions purposes is effectively accounted for in M1B.

The transactions characteristics of overnight RPs and Eurodollars remain a matter of debate. While some have argued that these assets are close substitutes for demand deposits, others view them as highly liquid investment items that are not close substitutes for transactions-type deposits. At this time, there is no clear consensus.[4]

HOW CONTROLLABLE ARE M1B AND M2?

If a monetary measure is to be useful in formulating a policy whose goal is to influence the pace of economic activity, it must not be influenced unduly by nonpolicy activity. Failure to meet this prerequisite indicates that the measure will be difficult for the Federal Reserve to control and may incorrectly signal the impact and direction of current policy.[5] Market interest rates, for example, are generally ambiguous indicators of monetary actions. This is because they are influenced both by monetary policy actions and by changes in financial market conditions (such as the demand for and supply of credit). Consequently, it is difficult to discern whether interest rate changes reflect policy actions or the combined effect of a host of other influences beyond the purview of the Federal Reserve.

M1B, M2 and the Adjusted Monetary Base

To assess the influence of nonpolicy actions on M1B and M2, it is instructive first to examine the relationship between these measures and the adjusted monetary base.[6] Because the Federal Reserve induces change in the adjusted monetary base, primarily through its open market operations, it can influence directly the expansion or contraction of bank reserves and, hence, the money stock. To determine the strength of this influence, the growth rates of M1B and M2 were compared with that of the adjusted monetary base using regression analysis.[7] The regression results for the period II/1960-II/1981 are (absolute value of t-statistics in parentheses):

$$\dot{M1B}_t = \underset{(0.62)}{-0.396} + \underset{(9.48)}{0.921}\,\dot{AMB}_t$$

$$\bar{R}^2 = 0.514 \qquad SE = 1.95 \qquad DW = 1.98$$

and

$$\dot{M2}_t = \underset{(4.84)}{4.82} + \underset{(4.23)}{0.572}\,\dot{AMB}_t$$

$$\bar{R}^2 = 0.168 \qquad SE = 2.11 \qquad DW = 1.98 \qquad \hat{\rho} = 0.61$$

where $\dot{M1B}$, $\dot{M2}$ and $\dot{AMB}$ are the annualized growth rates of M1B, M2 and the adjusted monetary base, respectively, $\bar{R}^2$ is the adjusted coefficient of determination, SE is the standard error of the regression, DW is the Durbin-Watson statistic and $\hat{\rho}$ is the first-order serial correlation coefficient.

This evidence strongly suggests that the growth of M1B adheres more to movements of the adjusted

[3]Thomas D. Simpson, "The Redefined Monetary Aggregates," *Federal Reserve Bulletin* (February 1980), p. 100.

[4]The flavor of the debate can be gleaned from Richard D. Porter, Thomas D. Simpson and Eileen Mauskopf, "Financial Innovation and the Monetary Aggregates," *Brookings Papers on Economic Activity* (1:1979), pp. 213-29.

[5]For a discussion of this and related issues, see Albert E. Burger, "The Implementation Problem of Monetary Policy," this *Review* (March 1971), pp. 20-30.

[6]The adjusted monetary base consists of member bank reserves at the Federal Reserve Banks, currency that is held by the public and in the vaults of commercial banks and an adjustment for reserve requirement ratio changes. A more complete discussion of the adjusted monetary base measure is found in R. Alton Gilbert, "Revision of the St. Louis Federal Reserve's Adjusted Monetary Base," this *Review* (December 1980), pp. 3-10.

[7]The regression results reported here are similar to those in John A. Tatom, "Money Stock Control Under Alternative Definitions of Money," this *Review* (November 1979), pp. 3-9. Preliminary tests indicate that, unlike Tatom's results, a lagged value of the dependent variable is not statistically significant.

monetary base — the measure directly influenced by policy actions — than does the growth of M2. This is evident in several ways. First, changes in the adjusted monetary base's growth account for over 50 percent of the variation in M1B's growth. In contrast, only 17 percent of the changes in M2's growth is explained by changes in adjusted monetary base growth. Second, the estimated point elasticities between changes in adjusted monetary base growth and changes in the growth of M1B and M2 reveal that M1B is considerably more sensitive than M2 to changes in the adjusted monetary base. A 1.0 percentage-point change in the growth rate of the adjusted monetary base leads to a 0.92 percentage-point change in the growth rate of M1B, but only a 0.57 percentage-point change in the growth rate of M2.[8]

Interest Rate Influences

Another aspect of the controllability issue to investigate is how sensitive the two monetary aggregates are to changes in market interest rates. As noted previously, interest rates may change for a variety of reasons, only one of which is a change in monetary policy. An aggregate exhibiting relatively greater sensitivity to interest rate changes would be a less pragmatic choice upon which to base policy decisions, because a desired, policy-induced change in this aggregate can easily be confounded by non-policy oriented changes in market interest rates.

To examine this issue, the growth rates of M1B and M2 are plotted (chart 1) for the period II/1959-II/1981, the full period over which consistent definitions for each measure are available. Chart 1 also delineates periods during which the 3-month Treasury bill rate consistently exceeds the Regulation Q ceiling rate on commercial bank savings deposits by 100 base points (1 percentage point) or more. What emerges from an inspection of chart 1 is that the growth of M2 generally *tends to be greater* than that of M1B: During this period M1B increased, on average, at about a 5.0 percent annual rate while M2 increased at about an 8.5 percent annual rate. More important, however, are the relative movements of the measures during periods of changing interest rates.

As chart 1 illustrates, during periods in which the 3-month Treasury bill rate exceeds the Regulation Q ceiling rate on savings deposits, the growth rates of M1B and M2 decline and the differential between the two narrows considerably. This pattern suggests that, as the opportunity cost of holding M1B and M2 deposits rises, funds flow out of these measures and into alternative, higher-yielding assets. During periods when the Regulation Q ceiling rate is significantly greater than the Treasury bill rate, however, the growth of M2 increases rapidly, much more so than M1B. This is because the non-M1B components of M2 now become relatively more attractive to investors seeking to maximize their interest income. The relative responsiveness of M2 to changes in interest rate differentials suggests that M2 growth is more sensitive than M1B growth to interest rate movements, simply because M2 includes more interest-bearing components, such as MMMFs, than M1B.

The differential growth rates of M1B and M2 during periods of changing interest rates suggest that the non-M1B components of M2 (which recently accounted for 75 percent of M2) are sensitive to such influences.[9] As seen in chart 1, however, the substantial reduction in the M2-M1B growth differential evidenced previously does not continue after IV/1977.

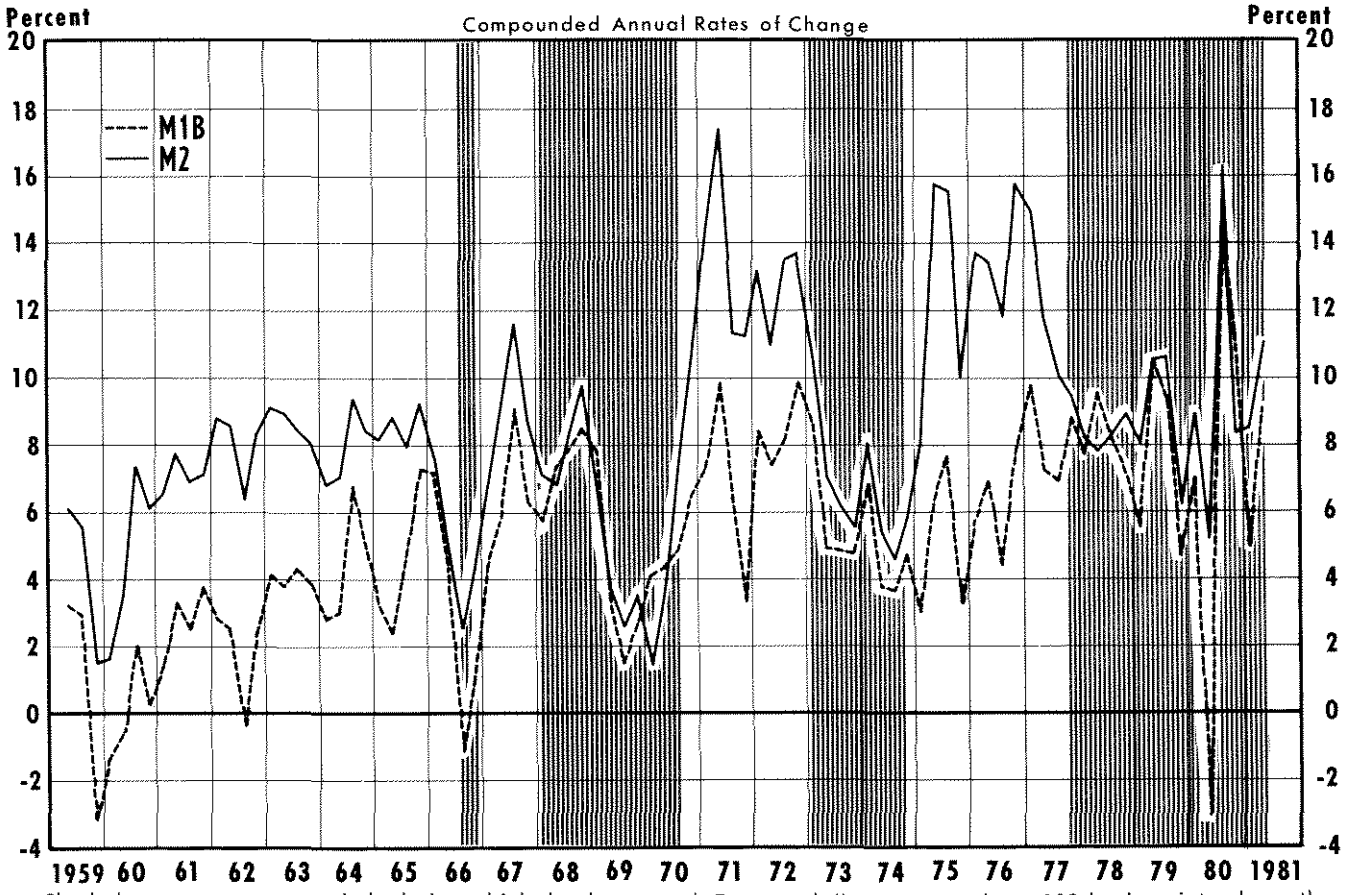
The recent behavior of M2 has been influenced heavily by the growth in MMMFs.[10] Because MMMFs represent alternative sources of interest income, their growth (and, consequently, their influence on M2) fluctuates with market interest rates. Moreover, the rates paid by MMMFs lag current market rates. When interest rates paid on competitive assets such as 3-month Treasury bills rise (fall),

[8]It should also be noted that a first-order serial correlation correction is necessary in estimating the M2 equation. This may suggest a misspecification of the M2 equation, a result of not capturing the systematic influence of other, unspecified variables. This is further evidence in support of the base-M1B relationship over the base-M2 relationship.

[9]This fact apparently is recognized by monetary policymakers. The "Record" of the February 2-3, 1981, meeting of the FOMC states: "Members differed somewhat more in their views concerning the broader monetary aggregates, in part because of uncertainty about the potential effects of interest rate relationships on the behavior of the nontransaction component." *Federal Reserve Bulletin* (April 1981), p. 315. Even so, the "Record" of the March 31 meeting states: "In evaluating the behavior of aggregates, it was agreed that *greater weight than before* would be given to the behavior of M-2." *Federal Reserve Bulletin* (June 1981), p. 501. (Italics added.)

[10]In the report submitted by the Board of Governors to the Joint Economic Committee on May 12, 1981, the importance of the growth of money market mutual funds in explaining M2 growth is clearly recognized: " . . . expansion in the nontransaction component of M-2 was largely sustained by the resumption of growth in shares of money market mutual funds. Such shares accounted for about three-quarters of the growth of M-2 between December [1980] and March [1981]," *Federal Reserve Bulletin* (May 1981), p. 413.

Chart 1
Growth Rates of M1B and M2



Shaded areas represent periods during which the three-month Treasury bill rate was at least 100 basis points above the ceiling rate on commercial bank savings deposits.
Latest data plotted: 2nd quarter

therefore, the growth of MMMFs slows (increases). Chart 2 offers evidence to support this relationship.

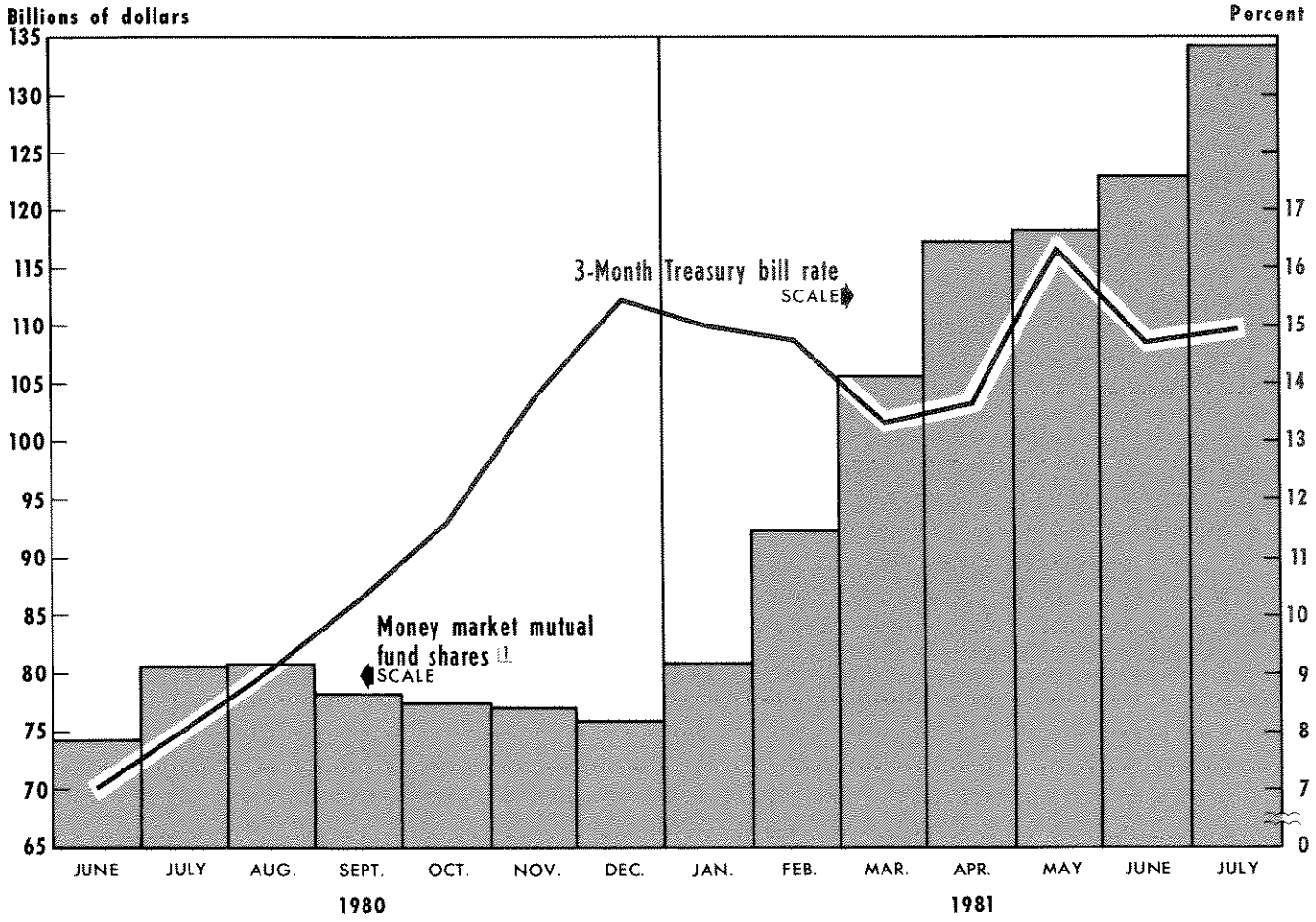
Between June and November 1980, MMMFs increased $2.8 billion. As illustrated in chart 2, this period is characterized by an increase in the 3-month Treasury bill rate of over 650 basis points. In contrast, the bill rate dropped over 200 basis points from December 1980 to March 1981, and MMMFs increased about $40 billion. Since March, the bill rate increased to over 16 percent in May, then declined to about 15 percent in July; the increase in MMMFs slowed during April and May, then resumed a rapid increase as the increase in the bill rate slowed.

The influence of MMMF growth on the growth rate of M2 relative to M1B is amply demonstrated by recent experience. From June to November 1980, M1B increased at a 15.3 percent rate while M2 increased at a 12.4 percent rate. Then, from November 1980 to July 1981, a period of restrictive monetary policy (the growth rate of the adjusted base fell from 11.5 percent to 4.4 percent over the two periods), M1B increased at a 4.0 percent rate while M2 increased at an 8.4 percent rate. It is important to recall that from June to November, MMMFs increased only $2.8 billion; from November to July, however, they increased $57.3 billion, largely accounting for the disparate growth between M1B and M2.

The evidence presented thus far shows M1B to be more closely linked than M2 to movements in the adjusted monetary base. The growth of M2, on the other hand, is distinctly more sensitive than M1B to alterations in interest rate differentials. This evidence marks M1B, *not* M2, as more useful in directing discussion and decisions about monetary policy.

Chart 2

Relationship Between Money Market Mutual Fund Shares and the 3-Month Treasury Bill Rate



[1] Not Seasonally Adjusted

M1B, M2 AND ECONOMIC ACTIVITY

Evidence in the preceding section suggests that M1B is more controllable (from a policy standpoint) than M2. The question now to investigate concerns the relationship between the growth of each monetary measure and the pace of economic activity. Previous study has demonstrated that changes in the growth of M1B and M2 precede fluctuations in economic activity measured by changes in nominal GNP growth.[11] Therefore, the important issue is which of these two measures is more closely related to (i.e., explains) movements in the growth of nominal GNP.

To examine this issue, equations relating the growth rate of nominal GNP to the growth rates of money and high-employment government expenditures were estimated using quarterly data over the period II/1960-II/1981.[12] The empirical results are presented in table 2.

The results indicate that both monetary measures exert a statistically significant impact on the growth of nominal GNP over a four-quarter period. This is evidenced by the large t-statistics reported for each measure, especially for the sum coefficient (Σm_i). A considerable difference exists, however, between the cumulative effect of changes in the growth of M1B and M2 on nominal GNP growth. The empiri-

[11]See R. W. Hafer, "Selecting a Monetary Indicator: A Test of the New Monetary Aggregates," this *Review* (February 1981), pp. 12-18. Nominal GNP is used because it is widely believed to be the channel through which monetary policy variables directly influence the economy.

[12]See Keith M. Carlson, "Money, Inflation, and Economic Growth: Some Updated Reduced Form Results and Their Implications," this *Review* (April 1980), pp. 13-19.

Table 2

Impact of M1B and M2 on GNP[1]

Equation Tested: $Y_t = \text{Constant} + \sum_{i=0}^{4} m_i M_{t-i} + \sum_{i=0}^{4} e_i E_{t-i} + \epsilon_t$

	M1B	M2
Constant	1.42 (1.22)	−0.41 (0.25)
m_0	0.493 (4.24)	0.147 (1.15)
m_1	0.445 (5.91)	0.265 (3.89)
m_2	0.209 (2.25)	0.257 (2.36)
m_3	0.013 (0.18)	0.126 (1.92)
m_4	−0.047 (0.40)	−0.026 (0.21)
Σm_i	1.113 (5.83)	0.769 (4.55)
e_0	0.097 (2.30)	0.119 (2.62)
e_1	0.033 (1.02)	0.058 (1.69)
e_2	−0.027 (0.78)	−0.002 (0.05)
e_3	−0.017 (0.51)	0.010 (0.28)
e_4	0.035 (0.83)	0.058 (1.26)
Σe_i	0.121 (1.29)	0.242 (2.50)
$\bar{R}^2$	0.407	0.305
SE	3.450	3.737
DW	2.12	1.91

[1]The equation tested uses a fourth degree Almon polynominal with both endpoints constrained. Absolute value of t-statistics appear in parentheses. $\bar{R}^2$ is the coefficient of determination corrected for degrees of freedom. SE is the standard error of the regression and DW is the Durbin-Watson test statistic.

cal results reveal that the cumulative impact of a 1.0 percentage-point increase in the growth of M1B yields an identical increase in the growth of nominal GNP within one year. A similar change in M2, however, leads to only a 0.77 percentage-point increase in nominal GNP growth. Thus, nominal GNP growth reacts more completely and rapidly to changes in the growth rate of M1B than to that of M2. Policy actions that influence the growth of M1B, therefore, will influence the pace of general economic activity more than those that affect M2 growth.

Further empirical support for the utility of M1B is found in the equations' summary statistics. The overall explanatory power of the M1B equation is greater than that for M2, indicating a more reliable relationship. This is evidenced by the larger $\bar{R}^2$ for M1B (0.41 as opposed to 0.31 for M2). This finding reaffirms the choice of M1B as the better measure of money to influence nominal GNP growth.[13]

CONCLUSION

Evidence has been provided on the current debate over M1B or M2 as a more appropriate monetary aggregate to observe in conducting monetary policy. Two aspects have been examined: (1) How controllable are the aggregates? and (2) How well do the two measures explain economic activity as measured by the growth of nominal GNP?

The results presented here indicate that M1B growth is more closely related to the growth of the adjusted monetary base, which directly reflects changes in monetary policy. An analysis of the influence of changes in market interest rates on the two measures also suggests that the growth of M1B is less sensitive than M2 to fluctuations in interest rates.

The growth of M1B also was shown to better explain the growth of nominal GNP. Statistical analysis indicates that a 1 percentage-point change in the growth of M1B results in 1 percentage-point change in nominal GNP growth, while a similar change in the growth of M2 does not. Thus, from the standpoint of influencing economic activity, controlling M1B is preferable to controlling M2.

The upshot is that policymakers would do far better to concentrate on controlling the growth of M1B than to continue the rather imprecise practice of attaching varying importance to the M1B and M2 aggregates whenever their growth rates diverge.

[13]This finding supports that reported in Keith M. Carlson and Scott E. Hein, "Monetary Aggregates as Monetary Indicators," this *Review* (November 1980), pp. 12-21.