The Monetary Base as an Intermediate Target for Monetary Policy

The potential usefulness for various purposes of the monetary base—roughly member bank reserves and cash in the hands of nonmember banks and the public—has been urged by a number of observers for many years One set of suggestions has involved proposals that the monetary base be used as a short-term tactical tool in the Federal Reserve's efforts to achieve its longer term money and credit objectives. In its October 6, 1979 announcement of a series of new policy actions, the Federal Reserve indicated that it did in fact intend to place "greater emphasis" on the bank reserves component of the base in day-to-day operations aimed at containing "growth in the monetary aggregates over this year within the ranges previously adopted". A second set of proposals regarding the monetary base, however, conceptually and practically quite distinct from its possible use as a short-term tactical objective, has been to replace the traditional monetary measures with the base in formulating the long-term targets themselves. Interest in the base as a possible replacement for the traditional measures in long-term targeting has become more prominent over the past year or two. This increased interest represents mainly a response to developing problems in interpreting the traditional money supply measures—problems stemming, in turn, from innovations in the use of deposits and deposit substitutes.

In advocating that the monetary base replace the traditional monetary series for long-term targeting purposes, a number of points are often made One is simply that data on the base become more quickly available and are less subject to error and revision than data on the money supply. The main points are less narrowly technical, however. Thus the claim has been made that the monetary base is about as closely related to aggregate demand as the monetary measures and that it is therefore at least as suitable a target for achieving broader economic objectives. And, it is argued, the recent developments cited above that have tended to loosen the relationship between the traditional money stock concepts and aggregate demand have not had comparably damaging effects on the monetary base. The implication is that for the future, at least, the relationship between the monetary base and aggregate nominal demand is likely to be more stable and predictable than the corresponding relationship involving the various money supply measures. Finally, it has also been argued that the monetary base is much more readily amenable to Federal Reserve control than are the money supply measures and that the base would make a superior target for this reason as well The purpose of this article is to take a fresh look at the possible value of the monetary base as a long-term target.

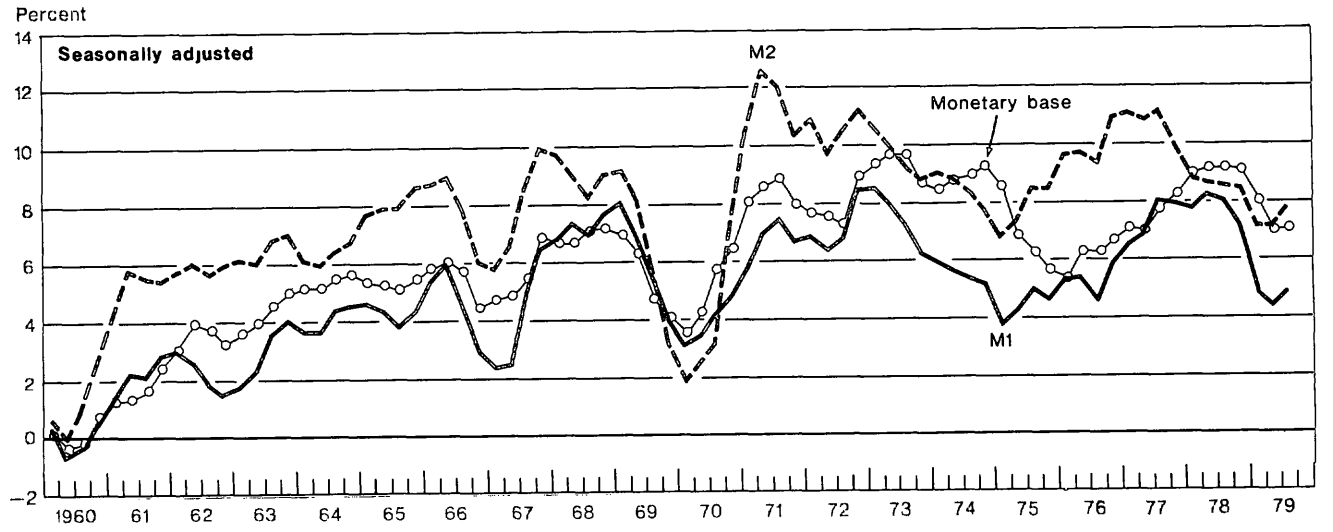
Defining and measuring the monetary base

The monetary base is most conveniently thought of as the sum of three items: (1) member bank reserves (about 28 percent of the total base), consisting of member bank deposits at the Federal Reserve Banks and member bank vault cash, (2) coin and currency in the vaults of nonmember banks (about 2 percent),

Chart 1

Growth of the Monetary Base and the Money Stock

Percentage changes from four quarters earlier

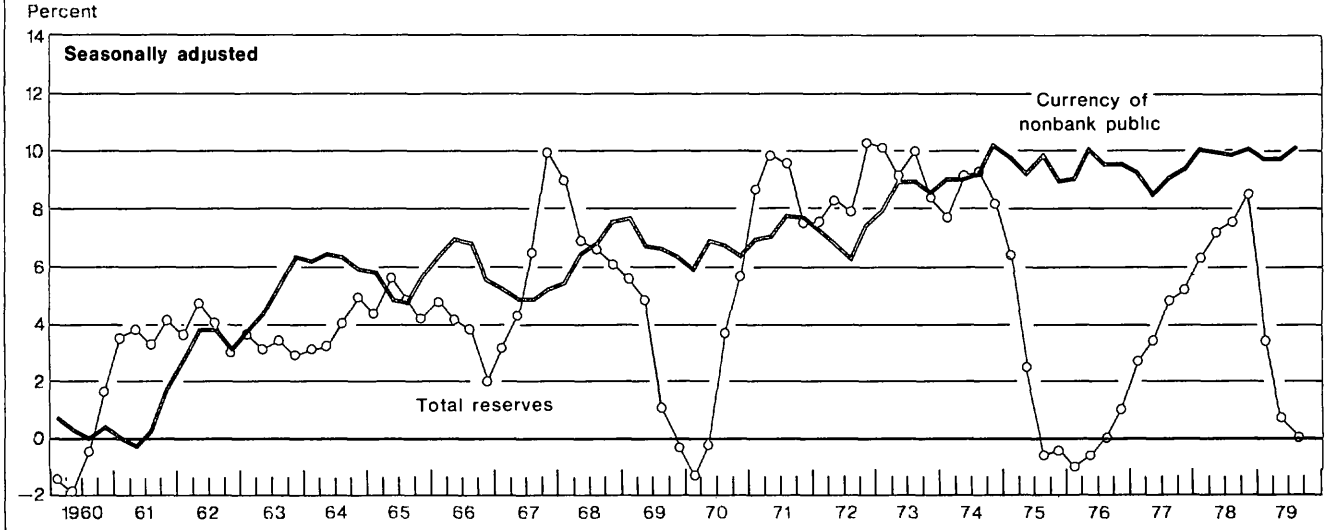


Monetary base data are adjusted for the effects of changes in reserve requirements by the staff of the Board of Governors of the Federal Reserve System

Chart 2

Growth of Major Components in the Monetary Base

Percentage changes from four quarters earlier



Data on reserves are adjusted for the effects of changes in reserve requirements by the staff of the Board of Governors of the Federal Reserve System

and (3) currency and coin held by the nonbank public (about 69 percent). The monetary base therefore consists of Federal Reserve liabilities in the form of member bank deposits and Federal Reserve notes, and Treasury liabilities in the form of outstanding Treasury coin and currency. The monetary base can thus be regarded as the consolidated, noninterest-bearing monetary liabilities of the Treasury and the Federal Reserve. As such it can be derived directly from their balance sheets in a manner similar to the derivation of member bank reserves.[1]

Since data on the monetary base are derived primarily from Federal Reserve and Treasury balance-sheet items and from vault cash data received from member banks, estimates of the base become available the day after the end of each banking statement week and are subject to only minor further revisions. These revisions mainly reflect quarterly bench-mark estimates of nonmember bank vault cash and revisions in seasonal adjustment factors. Thus the figures on the base are available more promptly and are substantially less subject to revision and to estimation problems than are the money supply figures.

A somewhat thorny problem which confronts the user of statistics on the monetary base as an analytical tool is just how to adjust for the impact of changes in reserve requirements. Any change in legal reserve requirement ratios—whether levied on deposits or on "nonmonetary" liabilities such as Eurodollar borrowings—obviously affects the amount of money (however defined) and bank credit that can be supported by a given level of reserves or the monetary base. Since the analytical significance of the monetary base for economic behavior lies primarily in the volume of money and credit it can support, the raw figures on the monetary base need to be adjusted somehow for the impact of changes in legal reserve requirement ratios.[2] To the extent that movements in the monetary base are regarded as a measure of the active impact of monetary policy, moreover, it also seems reasonable to adjust for the impact of regulatory reserve requirement changes since such changes obviously do represent policy decisions

While the need to adjust for reserve requirement changes is clear, there are in practice many ways in which this adjustment can be carried out. The choice among alternatives is not always obvious and depends in part on the analytical purposes for which the data are to be used. The adjusted monetary base data used in this article are those produced by the Federal Reserve Board staff. These data are designed to reflect adjustments only for regulatory changes in legal reserve requirement ratios. The adjustment procedure does *not* correct for changes in effective required reserve ratios that result merely from shifts in the composition of bank liabilities among categories with different reserve requirements. The four-quarter growth rate of the monetary base as adjusted by the Board staff, together with the corresponding growth rates of M_1 and M_2, is shown in Chart 1. The growth rates of the reserve and currency components of the base are compared in Chart 2.

Relationship of monetary base to GNP

As noted at the beginning of this article, a major issue in the possible use of the monetary base as a long-term target is the closeness and stability of its relationship to aggregate demand The importance of this issue is obvious. Movements in financial measures, whether of money, credit, or the monetary base, have no intrinsic interest. They are of significance only to the extent that they are related to fundamental economic objectives through their influence on aggregate demand.

One procedure for measuring the possible relationship between financial variables and aggregate demand that has become fairly standard over the past decade is simply to regress quarterly changes in demand as measured by nominal gross national product (GNP) on current and lagged changes in the financial measure in question. There are many reasons for treating the results of such regression equations with caution. First, experience shows that the results tend to be sensitive to such details as the time period over which the equations are estimated and the precise form in which the equation is estimated—*e.g.,* with or without fiscal policy variables, whether in percentage change or first-difference form, and so forth. Second, however formulated, there are substantial problems in attempting to assess "causal" significance from these equations—*i.e.,* the extent to which an empirical relationship discovered between nominal GNP and a particular financial measure provides evidence that manipulation

[1] A complication arises from the fact that, in the member bank reserve component, present rules count toward member bank reserves in a given statement week vault cash held two weeks earlier Hence any definition of the monetary base as the sum of member bank reserves, nonmember bank vault cash, and nonbank holdings of coin and currency must include not *this* week's member bank holdings of vault cash, but vault cash held two statement weeks ago This is the convention the Board of Governors staff has adopted in its published series on the monetary base and is also the one used in this article The St Louis Reserve Bank has chosen, instead, to include the *current* week's member bank vault cash For most purposes, the resulting differences are not important

[2] In some analytical frameworks, the monetary base, in representing the noninterest-bearing liabilities of the Government, is treated as part of the net wealth of the private sector For this purpose, no adjustment for reserve requirement changes is appropriate, but this aspect of the base is ignored in this article as being of only second-order importance

of the financial measure by the authorities would influence aggregate demand.

Despite these problems, it remains of some interest to see how the relationship of GNP to the adjusted monetary base as estimated in such statistical equations compares with the corresponding relationships derived from equations using the conventional money supply measures. The results of estimating equations using quarterly data on percentage growth in current dollar GNP and current lagged growth of M_1, M_2, the monetary base, and its major components are shown in Table 1. Results are shown both for the full 1961-78 period for which data on the adjusted base are available and for each half of this period. The results suggest that both for the full 1961-78 period and for each half of this period the adjusted monetary base has a weaker relationship to GNP than does either M_1 or M_2. Indeed for the most recent nine-year period, there is *no* statistically significant relationship between growth of GNP and current and lagged growth of the adjusted base.[3] It is also of interest to note that, even for the period as a whole, such relationship between the adjusted base and GNP as does exist is apparently due entirely to the currency component. In the formulation used here, at least, there is *no* statistically significant relationship between GNP and the adjusted reserve component of the monetary base. The apparent dependence of the relationship of the total base to GNP on its currency component is of interest since the volume of coin and currency in circulation is completely demand determined. That is, the banks supply whatever volume the public desires and, in turn, draw on the Federal Reserve to replenish their vaults. Thus it is difficult to see how any statistical relationship between the currency component of the monetary base and GNP could be interpreted as a "casual" relationship running from currency to aggregate demand.

In any case, the results reported in Table 1 certainly provide no reason for preferring the base over the conventional monetary measures.[4] Indeed, by themselves they suggest that the monetary base would have made an inferior intermediate target, relative to these conventional monetary measures, over the eighteen-year period covered by the statistical results.

An alternative statistical "horse race" that can be run between the monetary base and the conventional money supply measures consists of comparing their ability to "forecast" GNP on the basis of statistical relationships estimated from past data. In the particular "race" run here, equations treating GNP growth as a function of current and lagged quarterly growth rates in, alternatively, M_1, M_2, and the adjusted monetary base were estimated on data from 1961 through 1971. Using actual values of the growth rates of these financial measures, "forecasts" of quarterly changes in GNP for the four quarters of 1972 were then made from the equations. The (algebraic) average forecast errors for the four quarters of 1972, are reported in the first line of Table 2 in annual rates. Next, the estimating equations were updated to include 1972 data and similar "forecasts" were then made of GNP growth in the four quarters of 1973—and so on through forecasts of 1978. At the bottom of Table 2, averages of the resulting annual averages of quarterly forecast errors are reported in both algebraic and absolute terms.[5]

The results presented in the table seem to justify the following conclusions: (1) All three measures produce fairly sizable forecast errors on average and in many individual years. (2) For the 1972-78 period covered by the "forecasts", all three measures show a tendency to underforecast the growth rate of nominal GNP. (3) In terms of the absolute values of the forecast errors, the monetary base performs less well on average over the 1972-78 period than either M_1 or M_2 (but the differences are not statistically significant). Overall, these results again fail to point to any superiority of the base over the conventional money supply

[3] The results using the monetary base as adjusted by the Federal Reserve Bank of St Louis method, which is so constructed as to parallel movements in M1 and M2 more closely, are somewhat better than those for the Board-staff series but are still generally inferior to the money stock measures themselves, especially to M1 The $\bar{R}^2$ for the St Louis adjusted base measure over the full 1961-78 period is 0 16, well below that for M1 and M2 The St Louis series does about as well as the monetary measures in the first subperiod (with an $\bar{R}^2$ of 0 24), but the $\bar{R}^2$ drops to 0 09 for the 1970's

[4] Equations similar to those reported in Table 1 were run in which measures of changes in full-employment Federal expenditures and full-employment taxes and man-days lost due to strikes were included along with the various financial measures The inclusion of fiscal and strike variables improves the explanatory power of all the equations, but the qualitative conclusions regarding the base versus M1 and M2 remain the same The base performs notably worse than

Footnote 4 (continued)

M1 and M2 in the full period and both subperiods Indeed, the base does not make a statistically significant additional contribution, once the impact of the fiscal and strike variables are accounted for, at the 95 percent level according to the "F" test in any of the periods tested

[5] The procedure used here is essentially the one adopted by Leonall C Andersen and Denis S Karnosky in "Some Considerations in the Use of Monetary Aggregates for the Implementation of Monetary Policy", Federal Reserve Bank of St. Louis *Review* (September 1977), pages 2-7 The present procedures differ from theirs with respect to (a) the use of Board-staff data for the adjusted monetary base, (b) the period over which the equations were estimated, (c) the period over which the "forecasts" were computed, (d) the inclusion in the St Louis paper of strike variables in the equations, and (e) the number of lagged values used in the equations As in the St Louis paper, the results shown here were computed after a search for an optimal number of lagged values for the individual financial measures In the present case, the number of lagged values included is four for each of the three financial measures

Table 1

Regression Equations Relating GNP Growth to Current and Lagged Growth of Financial Measures

Financial measure	$\bar{R}^{2}$* 1961-I to 1978-IV	$\bar{R}^{2}$* 1961-I to 1969-IV	$\bar{R}^{2}$* 1970-I to 1978-IV	SEE*† 1961-I to 1978-IV	SEE*† 1961-I to 1969-IV	SEE*† 1970-I to 1978-IV
M_1	0 31	0 23	0 19	2 96	2.25	3 64
M_2	0 25	0 27	0.08	3 07	2 19	3.88
Monetary base adjusted	0 08	0 01	−0 06	3 41	2 56	4 16
Total reserves adjusted	−0 02	0 19	−0 11	3 59	2.31	4 26
Currency plus nonmember bank vault cash	0 11	0 13	+0 01	3 35	2.40	4 03

Current and four lagged percentage changes for the financial variables were used in the equations with unconstrained coefficients All variables are measured as quarterly percentage changes at annual rates using seasonally adjusted data. The monetary base and member bank reserve measures are adjusted for the effect of changes in required reserve ratios by the Federal Reserve Board staff.

* $\bar{R}^2$ is the square of the "coefficient of multiple correlation" (adjusted for "degrees of freedom") $\bar{R}^2$ measures, on a scale of zero to one, the proportion of the variation in gross national product (GNP) growth that can be accounted for by the regression equation on the basis of variations in the current and lagged growth of the financial measures The "standard error of estimate" (SEE) is the square root of the average squared error made by the equation in estimating GNP growth rates over the sample period on the basis of the current and lagged growth rates of the financial measure. As is apparent from these definitions, the association of movements in GNP growth rates with current and lagged movements in the growth rates of the financial measures is the closer, the larger is the $\bar{R}^2$ and the smaller is the SEE

† In percent at annual rates

Table 2

Errors in Forecasting Quarterly GNP Growth Rates Averaged over Four-quarter Periods

Errors measured in percentage annual rates

Period	Forecast errors from equations using M_1	M_2	Adjusted monetary base
1972	2 2	2.1	3 5
1973	1 7	1 7	0 9
1974	−0 9	−1 3	−2 7
1975	3 0	2 2	2 1
1976	0 9	−0.5	1 7
1977	1 5	1 9	2 9
1978	2 9	4 2	2.9
Average error	1 6	1 5	1 6
Average absolute error	1 9	2 0	2 4
Root mean square error	2 0	2 2	2 5

As described in the text, all forecasts are computed from equations estimating quarterly GNP growth on the basis of current and four-lagged values of growth rates of financial measures based on data from 1961 to the final quarter of the year just prior to the year for which the forecasts are made The forecasts are made using actual values of the financial data

Table 3

Fourth-Quarter to Fourth-Quarter Growth Rates in Selected Aggregates

Year	Non-borrowed base*	Total monetary base*	M_1	M_2
1969	3 1	4 1	3 9	3 2
1970	7 6	6 5	4 8	7 2
1971	8 2	8 0	6 6	11 3
1972	8 6	9 0	8 4	11 2
1973	8 0	8 7	6 2	8 8
1974	7 9	9 3	5 1	7 7
1975	6 7	5.7	4 6	8 4
1976	6 7	6.7	5 8	10 9
1977	7 5	8 3	7 9	9 8
1978	9 2	9 1	7 2	8.4

* Adjusted for changes in reserve requirements.

measures in terms of past performance and suggest that, if anything, the base does less well than the conventional measures.[6]

This sort of statistical evidence aside, there are some plausible reasons to think that the monetary base, even after adjustment for changes in reserve requirement ratios, might be less closely related to nominal aggregate demand than the money supply measures. Every development that shifts the "demand for money"—the amount of money balances people wish to hold under given interest rate and GNP conditions—must also shift the demand for the monetary base, since it must affect either the demand for the currency or the reserve component of the base. But there could be some developments that would shift the demand for the base that would *not* affect the demand for money. One such possible source of comparatively greater instability in the demand for the base would be shifts in the public's desired currency-deposit mix. Such shifts could result, for example, from shifts in the *composition* of aggregate demand toward transactions that involve a higher proportion of cash payments relative to checking transactions. Developments of this kind would have no effect on the total demand for the money, but they would shift the demand for the base.[7]

Alterations in bank demands for excess reserves would also be reflected in a shift in the demand for the base but not for money. Member bank excess reserves have for many years been close to frictional minima, so that this cannot have been an important factor influencing the closeness of the base/GNP relationship. But any legislative changes that tended to reduce legally required reserves below the levels desired by the banks themselves could make potential shifts in the demand for "excess" reserves a more significant factor in the future than it has been in recent decades. Finally, shifts in interest rate ceilings or other market factors affecting the demand for reservable, nonmonetary bank liabilities shift the demand for reserves, and thus for the base, without any corresponding destabilizing effects on the demand for the conventional money stock measures.[8]

Does the monetary base offer a way out of current problems with conventional money supply measures?

The most important issues concerning the stability of the relationship of the monetary base to aggregate demand involve not the past, but the present and the immediate future. While some support has been voiced in the past for replacing money supply measures as long-term policy targets with the monetary base, most support for such a move is of quite recent date. The upsurge of interest in the base stems basically from the large number of recent institutional, regulatory, and market innovations affecting the demand for money in its various definitions.

One group of developments has involved the transformation of deposit categories other than demand deposits into the functional equivalent of transactions accounts. Examples include the inauguration of NOW (negotiable order of withdrawal) accounts in some states, the authorization to use savings accounts for automatic transfer account purposes, and telephone transfer procedures for commercial bank savings and thrift accounts. Developments of this kind have had their primary effect on reducing the demand for demand deposits and thus for the narrow M_1 definition of money. To a lesser extent they have involved shifts out of *all* types of commercial bank deposits to thrift institution deposits and, to that extent, they have also had some depressing effect on the demand for M_2. They have probably had little effect, however, on the M_3 definition, which includes both bank and thrift institution deposits.[9]

A second, and related, set of developments has involved the increasing use of close *non*deposit substitutes for "money", instruments not included in *any* of

[6] The root mean square errors for the twenty-eight individual quarterly forecasts are 3 5 percent for M_1, 3 8 percent for M_2, and 4 4 percent for the adjusted monetary base These root mean square errors are comparable in magnitude and are the same in rank order as the standard errors reported in Table 1 The appearance of a contrast between a substantially worse performance for the base as reported in terms of $\bar{R}^2$s in Table 1 and the only moderately worse performance reported in Table 2 seems to reflect the fact that relatively large differences in $\bar{R}^2$s are associated with relatively modest differences in standard errors and the fact that, in Table 2, annual average forecast errors are reduced to the extent that positive and negative forecast errors within the year offset each other This results in the smaller root mean square errors reported for all three measures at the bottom of Table 2

[7] Historically, shifts in the public's demand for currency relative to deposits have on occasion had a dramatic effect on the relationship between the base and aggregate demand For example, from 1929 to 1933 the monetary base actually rose as the public's demand for currency relative to deposits and the banks' demand for excess reserves swelled, yet aggregate demand along with standard definitions of money fell sharply

[8] For example, large negotiable certificates of deposit (CDs)—$100,000 or over—fell by roughly $16 billion between January and July 1979, apparently largely reflecting relatively unfavorable cost relationships (especially relative to Eurodollar borrowings, which rose substantially over the same period) While exact figures are not available, it appears that this decline in large CDs may have reduced required reserves by about $1 billion over this period Over the same period, total reserves declined by about $1 7 billion

[9] For an analysis of recent developments affecting conventional definitions of the money supply, see "Defining Money for a Changing Financial System", by John Wenninger and Charles M Sivesind, this *Review* (Spring 1979), pages 1-8

the conventional monetary definitions. This second set of developments has therefore tended to depress the demand for *all* the conventional measures of money. Most prominent among these developments is the dramatic expansion beginning in late 1978 of money market mutual funds, which usually provide checking privileges. Other examples include the increased use of corporate repurchase agreements, which appear to be close substitutes for demand and/or short-term time deposits, and of United States resident holdings of Eurodollar deposits. The problem with these various developments so far as monetary aggregate targeting is concerned is that they clearly require some adjustment of the published numbers on the conventional monetary measures to arrive at a realistic assessment of what these numbers mean for aggregate demand as interpreted in the light of past relationships.

Now if one knew exactly *to what extent* these various developments had reduced the demand for the various conventional monetary measures—*i.e.*, the extent to which the raw figures on current movements in the aggegates need to be raised to make them comparable to past movements in terms of their broader economic significance—these developments would create no particular problem. A problem is created, however, by the existing uncertainty about the appropriate size of the needed adjustments in the conventional money stock figures. Just to give one example, money market mutual funds rose by $9 6 billion between September 1978 and March 1979. How much of this large rise should be regarded as coming out of M_1? How much out of M_2, or M_3? How much of the increase represents a true shift in the demand for these aggregates under given economic conditions and how much merely reflects the normal substitution out of money into other short-term earning assets that always occurs when market interest rates rise?

While estimates are of course possible, no one can give precise and certain answers to these questions. And, to the extent that uncertainty about the appropriate adjustment exists, problems are created for interpreting the actual movement of the conventional money measures and in setting appropriate targets for them Moreover, as long as the process of innovation in the use of money substitutes continues, such problems will also continue.

It is in the context of these problems with the monetary aggregates that some have suggested a shift to the monetary base for targeting purposes and for analyzing the thrust of policy. But it seems difficult to make a convincing case for such a recommendation on this basis. The same developments that create problems for the conventional monetary measures also create problems for the monetary base. As is the case with the money supply measures, the stability and predictability of the relationship of the monetary base to aggregate demand depends upon the stability of the demand for the monetary base under "given" economic conditions (which usually means given interest rate and aggregate demand conditions). But the demand for the monetary base is derived from essentially two sources: (1) the public's desire to hold coin and currency and (2) the banks' desire to hold reserves. And, since member bank holdings of excess reserves are essentially zero, the banks' "demand" to hold reserves is for the most part just the level of required reserves they must hold against deposit and nondeposit liabilities. So the demand for reserves is directly related to the public's demand to hold these liabilities.

The implication of this is that the recent developments that have shifted the demand for money by unknown amounts must also have shifted the demand for the base by unknown amounts because they will have shifted the demand for reserves. To be sure, the larger weight of currency in the base relative to its weight in the various money supply measures means that, in a purely arithmetic sense, the affected portion of the base (required reserves) is smaller than the affected portion of the money supply (deposits). But this arithmetic truism would seem to be of little comfort to the user of the monetary base. The impact of the monetary base on the economy will be subject to less uncertainty than the monetary measures as a result of shifts in the demand for deposits only if a dollar of currency is assumed to be just as "important" as a dollar of reserves even though the latter supports multiple dollars of money and credit. This does not seem likely to be true. In short, the monetary base does not seem to offer a way out of the problems created by recent innovations that have affected the demand for the conventional monetary measures.

Indeed, in one respect, the problems created for the base may be more severe than those created for at least the broader money supply measures. For example, if automatic transfer accounts represent in part shifts out of demand deposits, the demand for M_1 will be reduced by an amount that can only be estimated since some of these funds may have come out of ordinary passbook savings accounts or out of some other type of deposit. But the resulting problems for M_1 could be circumvented by working with a broader aggregate, such as M_3, that includes *all* the potentially affected deposit categories.

Similar solutions are not available to get around the problem as it affects the monetary base. Under current law and regulations, required reserve ratios against demand deposits may be as high as 16.25 percent while the required reserve ratio for member bank sav-

ings accounts is only 3 percent and, of course, there are currently no required reserves for accounts at thrift institutions. Thus the shift of unknown magnitude out of demand deposits and into automatic transfer accounts will create a shift, also of unknown magnitude, in the demand for the reserve portion of the monetary base altering its prospective relationship to aggregate demand relative to past relationships.

Controllability of the monetary base

One argument that is sometimes made for the monetary base as a long-term target measure is that its growth could be more accurately controlled by open market operations than can the various money supply measures. In part, the argument for the superior controllability of the base rests on the point noted earlier that incoming data on it are substantially less subject to error and subsequent revision than are the money supply figures. More fundamentally, however, the argument for the superior controllability of the base is that the Federal Reserve can use open market operations to offset the so-called "operating" or "market" factors (such as float) that influence bank reserves and the base. Given the ability to offset these factors, the nonborrowed portion of the monetary base—*i.e.*, the total excluding member bank borrowings from the Federal Reserve Banks—can be controlled over any desired time horizon subject only to errors in estimating the behavior of the operating factors. Such errors tend to be self-canceling over more than a few weeks.

While the Federal Reserve can indeed control the nonborrowed portion of the monetary base with reasonable precision over a period of weeks, the dependence of member bank borrowings on the decisions of the banks (subject to the rules of discount window administration) makes the controllability of the *total* monetary base a more complex problem. It is useful in this connection to distinguish between short-run control periods, which can be identified with the roughly one-month periods between Federal Open Market Committee (FOMC) meetings, and long-run control periods, which can be identified with the four-quarter spans over which the long-run monetary aggregate targets are defined.

In the short-run context, a critical point is that member bank excess reserves tend to average close to frictional minima over a period of weeks and to show little systematic sensitivity to interest rate movements. Consequently, movements in the total reserve component of the base tend largely to mirror movements in required reserves. And in the short period of a few weeks between FOMC meetings, required reserve movements tend to be only marginally responsive to the volume of nonborrowed reserves supplied.[10] Thus, with both excess and required reserves largely unresponsive to the behavior of nonborrowed reserves in the short run, the volume of reserves supplied through open market operations in the short run mainly affects the extent to which member banks are forced to meet their reserve requirements through borrowings at the discount window. For example, the larger the volume of nonborrowed reserves supplied through open market operations, the smaller will be the banks' recourse to the discount window in meeting reserve requirements. The effect on *total* reserves, nonborrowed plus borrowings, and on the *total* monetary base appears to be quite small over these short periods. Hence, most of the problems of predicting and influencing required reserves that make short-run control of the money supply so difficult also complicate efforts to achieve short-run control of the total monetary base.

Over an "intermediate" period of several weeks or a few months, it is plausible to believe that the total monetary base or total reserves should be more accurately controllable than measures such as M_1 and M_2. At least this is true to the extent that emphasis in day-to-day and week-to-week open market operations is placed on the volume of nonborrowed reserves or the nonborrowed base rather than on particular levels of interest rates such as the Federal funds rate The superior controllability of the total base under these conditions is plausible simply because the only source of slippage between *nonborrowed* reserves or (allowing for currency) the nonborrowed base and the *total* base

[10] Under the "lagged reserve accounting" procedures currently in effect, deposits in a given week determine required reserves two statement weeks later Thus, at the beginning of any statement week, required reserves for the current and following statement week are already determined and by definition completely unresponsive to the level of nonborrowed reserves Hence, the impact of this week's level of nonborrowed reserves on money market conditions and on public and bank portfolio adjustments can affect required reserves only in the third following week at the earliest Even if reserve requirements this week were levied on *this* week's deposits, the volume of nonborrowed reserves supplied this week would affect this week's deposits and required reserves only to the extent that bank and public portfolio adjustments respond promptly to the impact of changes in reserve availability and to concomitant changes in money market conditions If such portfolio adjustments tend to take place only gradually, however, then changes in nonborrowed reserves in the current week might have little effect on required reserves, and hence on total reserves, in the current statement week even in the absence of a lagged reserve accounting system The exact speed of response of such portfolio adjustments to changes in current reserve availability, and therefore the extent of the actual influence of lagged reserve accounting in slowing the response of deposits and required reserves to changes in nonborrowed reserves is a matter of controversy Whatever the answer, it does seem clear that portfolio adjustments unfold over time Thus the full impact of changes in nonborrowed reserves on deposits, required reserves, and total reserves will be felt only over a period of weeks or even months

is member bank borrowings. But, in the case of measures such as M_1, M_2, or bank credit, there is a second slippage between nonborrowed reserves or the nonborrowed base in the form of potential changes in the "multiplier" relationship between the total base and any one of these money or credit measures. Clearly, unforeseen movements in the multiplier represent an additional source of difficulties in controlling money and credit measures relative to controlling the base.

In any event, from the point of view of influencing ultimate economic objectives, and certainly from the point of view of choosing long-term targets, it is the relative controllability over periods of perhaps six months or longer that is relevant in comparing the base with money and credit measures. Over horizons as long as the four-quarter spans used currently to define long-term targets, problems of controlling both money supply measures and the monetary base are considerably less acute than they are in the short or even intermediate run—at least from a purely technical point of view. Indeed, there seem to be grounds for believing that, over periods as long as a year, problems of achieving targets for any of these measures may be not so much technical as they are the result of substantive policy dilemmas.

But, from a purely technical point of view, the relative controllability of the monetary base versus the money supply measures over a one-year horizon depends significantly on the tactical *modus operandi* of open market operations. To the extent that the tactical approach chosen is one of inducing the desired aggregate growth rates by influencing money market conditions, as measured, for example, by the Federal funds rate, the problems of controlling the base would prove essentially the same as those encountered in attempting to control the money supply measures And they would be no easier to solve. For all these various aggregate measures, planning to achieve stated targets requires projections of the interest rate path expected to be associated with the desired growth rate of the financial aggregate In practice, the needed projections must encompass projections of mutually compatible paths for interest rates, the financial aggregates, and aggregate demand The difficulties of making such projections are substantial. And they do not appear to be significantly less substantial for the monetary base than for money and credit measures

A different approach to the problem of long-run control would be to attempt to control the monetary base over one-year horizons by setting objectives for the *nonborrowed* base, a measure which should itself be controllable over a one-year period with a very high degree of accuracy for reasons already given. Since the difference between the nonborrowed and total monetary base is simply member bank borrowings, a relatively small proportion of the total,[11] one-year growth rates in the total base do, in fact, tend to show a reasonably tight relationship to corresponding growth of the nonborrowed base (see Table 3). Even so, the slippages have been significant on occasion, reflecting substantial year-to-year variability in member bank borrowings. These variations, in turn, primarily reflect sometimes sizable shifts in the relationships of the discount rate to market interest rates.

On balance, it appears that, from the point of view of longer run control, increased emphasis in day-to-day actions on reserves and reduced emphasis on interest rates, such as was announced by the Federal Reserve on October 6 to enhance control of the long-term money supply targets, would tend to enhance the long-run controllability of the base to an even greater degree. Thus in this respect the new procedures tend also to enhance the relative attractiveness of the total base as a long-term target.

Conclusion

In evaluating the potential merits of the monetary base or any other measure for long-term targeting purposes, a number of considerations should be taken into account. The strongest argument for the base is that it does seem more amenable to control than the conventional money measures, at least beyond the very short run and provided the focus of tactical operations is on nonborrowed reserves rather than on interest rates. But this advantage has to be qualified by the comment that, over periods as long as a year, problems of control for *any* of the major money and base aggregates may not be primarily technical. With respect to its relationship to aggregate demand, the statistical evidence reported here suggests that in the past the base has been at least somewhat less closely related to nominal GNP than has been the case for the conventional money measures. The weight to be given to this sort of evidence needs to be supplemented with more general considerations Shifting public preferences as between deposits and currency, shifting bank demands for excess reserves, and changing market developments affecting nondeposit liabilities are all potential sources of instability in the relationship of the base to aggregate demand And such

[11] Excluding exceptional borrowings, such as those to the Franklin National Bank prior to its collapse, quarterly average borrowed reserves in recent years have rarely exceeded $2 billion or about 1 4 percent of the current level of the base of roughly $150 billion

sources of possible instability tend to count against the base as a possible long-term target.

Finally, there should be no illusion that the base is immune to the problems of interpretation that have recently been created for the conventional money measures by innovations in the use of deposits and deposit substitutes. The new developments do create real problems in setting long-term targets, both for the money measures and for the base. There are probably no completely satisfactory solutions to these problems. But the replacement of all money stock measures in long-term targeting by a single target for the monetary base does not appear to be a particularly attractive option. The development of new money stock measures that take account of the recent financial innovations appears a more promising approach to dealing with the implications of these innovations for formulating long-term policy targets.

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