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# Improving the Monetary Aggregates

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Report of the Advisory Committee on  
Monetary Statistics

Board of Governors of the Federal Reserve System

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# Preface

In early 1974, the Board of Governors of the Federal Reserve System asked a group of prominent economists to review the monetary aggregates used by the Federal Reserve in the formulation and implementation of monetary policy. The experts were asked to focus their investigation on a technical evaluation of the quality of the monetary statistics in question.

The Advisory Committee on Monetary Statistics was chaired by Professor G. L. Bach (Stanford University), Professor Phillip D. Cagan (Columbia University) served as Executive Secretary. Other members of the Committee were Professor Milton Friedman (University of Chicago), Professor Clifford G. Hildreth (University of Minnesota), Professor Franco Modigliani (Massachusetts Institute of Technology), and Dr. Arthur Okun (the Brookings Institution). Professor Paul McCracken (University of Michigan) was a member of the Committee originally, but withdrew because of the pressures of other duties.

The Committee's report contains seven principal recommendations that relate to the measurement, definition, adjustment for seasonal variation, and publication of the several statistical series on the monetary aggregates. In selecting the monetary aggregates to be

examined, the Committee was guided, as its report indicates, by "received doctrine among leading monetary economists and practitioners in monetary policy."

The Board's research staff prepared a number of studies for the Committee. A companion volume to this Report, containing eight staff papers drawing on these original studies, will be published by the Board at an early date.

Board staff support of the work of the Advisory Committee on Monetary Statistics was supervised throughout most of the period by James L. Pierce, who at the time was Associate Director of the Division of Research and Statistics, and, subsequently, by Edward C. Ettin, Adviser in the Division of Research and Statistics. Members of the staff of the Division of Research and Statistics and the Division of International Finance working with the Committee were Darwin L. Beck, Helen T. Farr, Arthur B. Hersey, Darrel W. Parke, David Pierce, Richard D. Porter, Henry S. Terrell, Thomas Thomson, and Neva Van Peski. In addition, Anton S. Nissen, Assistant Vice President at the New York Federal Reserve Bank, contributed to the work of the Committee.

The Board of Governors greatly appreciates the contribution made by the Committee and will carefully consider its recommendations.

*Arthur F. Burns, Chairman*  
Board of Governors  
of the  
Federal Reserve System

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*Preface*

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# Introduction

The Board of Governors requested this Committee to review the basic monetary statistics (especially the so-called monetary aggregates) used by the Federal Reserve in formulating and conducting monetary policy, to evaluate their adequacy, and to present suggestions for their improvement. It asked the Committee to study and make recommendations only on the statistics in question—not to evaluate monetary policy or to investigate the significance of the aggregates relative to interest rates or credit market indicators.

We have adhered rigorously to this directive. It is impossible, however, to select the monetary totals, or aggregates, to examine without judging to some extent their usefulness for policy purposes (for example, deciding that the “money stock” as usually defined to include adjusted demand deposits plus currency in the hands of the public—generally termed  $M_1$ —may be important for policy purposes). In making these decisions, we have been guided as far as possible by received doctrine among leading monetary economists and practitioners in monetary policy, rather than imposing our views as to the optimal theoretical approach to policy issues. Indeed, the views of members of the Committee differ substantially on these issues.

The present basic monetary statistics of the Federal Reserve are the product of many years of intensive work—by independent research workers as well as by Federal Reserve staff members. The statistics have been steadily improved over the years by repeated

revisions. We have been impressed by the care and quality of work devoted to collecting and combining the data that comprise these series. Yet conceptual difficulties have led to continuing debates over some of the series, and technical problems of data collection and processing have prevented compilation of series in full accord with the conceptual foundations. In view of the substantial weight given monetary aggregates in recent years, it is important that the data used be the best that it is possible to obtain.

As we emphasize in the section on conceptual issues, no one monetary aggregate is clearly preferable to all others on all scores, each has its theoretical and practical strengths and weaknesses as a guide to, or intermediate target for, monetary policy operations, and as a measure of the effectiveness of such operations. Given our terms of reference and the limitations imposed by the time available, we have concentrated mainly on the reserve base, or “high-powered” money, and on the main deposit-based series ( $M_1$ ,  $M_2$ ,  $M_3$ ,  $M_4$ , and  $M_5$ ), suggesting changes that we believe are feasible at a reasonable cost and that could substantially improve the conceptual validity and measurement accuracy of the aggregates involved. We provide first a summary of our major recommendations, with very brief explanations of each, then a more complete analysis of the conceptual and definitional issues involved, and finally a detailed rationale for the specific statistical recommendations made by this Committee.

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While, within the broad framework of our assignment, we have had complete independence as to topics to consider, approaches to issues involved, and recommendations, we wish to acknowledge the extensive and invaluable assistance provided by members of the Board's economic and statistical staff. They have been fully cooperative and have produced several dozen special studies at our request, many of them of very substantial magnitude. Without this staff work we would have faced a vastly

longer task of contracting out such studies to others, indeed no outsider could have accomplished a number of the detailed tasks we assigned in examining both present statistical procedures and alternatives we wished to consider. We deeply appreciate this assistance.

The staff has combined these studies into eight Staff Papers, which are published as a separate volume. The Appendix at the end of this report lists and briefly summarizes the Staff Papers.



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## Summary of Recommendations

### 1 Alternative concepts of money

*Since no one monetary aggregate is clearly preferable to all others on all scores, we recommend that the Federal Reserve publish regularly the "reserve base," and the major monetary aggregates currently designated  $M_1$ ,  $M_2$ ,  $M_3$ ,  $M_4$ , and  $M_5$ , although with substantial modifications as indicated below*

### 2 Nonmember bank deposits

*To reduce large errors in preliminary estimates of deposits at nonmember banks, we recommend prompt establishment of a weekly reporting sample of large and small nonmember banks and collection of weekly-average-of-daily-deposits data from nonmember banks four times annually in connection with call reports*

Recent experiments with a weekly reporting sample of large and small nonmember banks convince us that regular collection of such additional information could dramatically reduce the large errors now often made in estimating nonmember bank deposits between call report dates, and that such data could be obtained and processed without unreasonable cost to either reporting banks or to the Federal Reserve. In addition, the present limitation of call report data to a single day is a substantial additional source of error that could be eliminated by collecting weekly-average data on call reports. In combination, these two reforms could substantially eliminate the errors now faced in estimating nonmember bank deposits.<sup>1</sup>

<sup>1</sup>As this report is being completed, we are informed that the Federal Deposit Insurance Corporation (FDIC) will begin to collect from nonmember banks 7 days of deposit data for the week surrounding each call report date, beginning in March 1976.

### 3 Consolidation of accounts at different financial institutions

*We tentatively recommend a new, simpler process of handling interbank deposits and cash items in process of collection when consolidating data from different financial institutions, in order to eliminate certain biases and to obtain a more accurate measure of  $M_1$  and other aggregates.*

There is general agreement that cash items in process of collection (mainly checks) should be deducted from demand deposits on banks' books, in order to avoid the double counting of deposits already credited to accounts of recipients but not yet deducted from accounts of payers. However, serious problems arise in making this adjustment, because some banks that clear checks through correspondents show checks in process of collection on their balance sheets as "due from banks" instead of "cash items in process of collection (CIPC)", because cash items include checks not drawn on private accounts (for example, checks on U.S. Treasury, interbank, and some foreign accounts not included in  $M_1$ , as well as money orders, redeemed Government bond coupons, and food stamps), and for other reasons to be detailed later.

To eliminate this apparent bias (overstatement), we tentatively propose an alternative means of consolidating the accounts of the banks involved—basically by deducting directly from gross demand deposits (which include "due to banks") both "due from banks" and "cash items," in lieu of the present more elaborate set of adjustments made to obtain adjusted demand deposits. Preliminary calculations made at our request by the Board's staff suggest that this change would reduce the

level of  $M_1$  by some \$8 billion from presently reported figures and would reduce week-to-week and month-to-month variations in the reported money stock, which may now reflect spurious fluctuations in the volume of domestic and foreign checks in process of collection. Since the reasons for the large reduction in the reported level of  $M_1$  under this new method as compared with the method now used are not entirely clear, however, we recommend adoption of the proposed change only tentatively, subject to further investigation by the Board along the lines currently being undertaken.

#### 4 Foreign deposits in the United States and U.S. dollars held abroad

*To obtain the most useful aggregates for U.S. policy decisions and actions, we recommend elimination from the U.S. monetary aggregates of deposits held in the United States by foreign commercial and central banks and other official institutions, and continued exclusion of U.S. dollars (Euro-dollars) held abroad.*

In an open economy like that of the United States, interactions between domestic and international transactions on trade and capital accounts make it impossible for the monetary authorities to consider only domestic consequences of their actions—and by the same token make any purely domestic measure of the money stock to a degree unsatisfactory as an intermediate target variable. As there is no one ideal concept of money for domestic monetary control purposes, so there is no one ideal concept for an open economy or for the world economy, the existence of international transactions that interact with domestic transactions in the United States makes the definition problem more difficult than for a purely domestic economy. However, given the theoretical difficulty of prescribing any ideal amount of foreign or international money to be included in the U.S. money stock, the practical difficulties in obtaining the desired data even if they could be conceptually specified, and the relatively

modest role played by international transactions in the U.S. economy—we recommend, as a practical matter, use of a concept of money focused primarily on the domestic economy.

At present, all deposits of foreign individuals and businesses, foreign commercial banks, and foreign central banks and other official institutions at banks in the United States are included in the U.S. money stock, and no U.S. dollar deposits abroad (for example, Euro-dollars) are included, no matter who owns them. We recommend including foreigners' deposits in the United States where these are likely to be used primarily for purchases of U.S. goods, services, and securities and excluding all U.S. dollar deposits abroad—mainly because there is no practical way of incorporating these data into current U.S. money stock series even though some such balances may be held primarily with a view to purchases in the United States. Applying these criteria, we recommend that deposits of foreign commercial banks and foreign central banks and other official institutions in the United States be excluded from the U.S. money stock, since these are apparently held primarily for clearing Euro-dollar transactions, for financing foreign exchange transactions, and as international monetary reserves, but that deposits of foreign individuals and businesses continue to be included.

The Federal Reserve should, however, continue to publish, as memorandum items, data on deposits of foreign commercial and central banks and other official institutions in the United States and U.S. dollar deposits abroad, so that those wishing to include them in the U.S. monetary aggregates, or to use them for other purposes, will be able to do so.

#### 5 Seasonal adjustment of monetary aggregates

*We recommend that the Federal Reserve authorities publish periodically the seasonal adjustment factors they propose to use in arriving at the desired money stock throughout the year ahead (the "policy" seasonal), so that*

*the Fed's attempts to eliminate seasonal variations will not be confused with more basic determination of the desired money stock or other monetary aggregates. We further recommend that, in estimating seasonal adjustment factors for the money stock, looking backward (the "descriptive" seasonal), the Fed substitute for the so-called Census Bureau X-11 seasonal adjustment method a modified method that more effectively uses the daily data available.*

The Federal Reserve authorities and most other users of monetary statistics work primarily with seasonally adjusted series. Because the Federal Reserve itself to a substantial extent controls the amount of money, to isolate any "natural" seasonal in the money stock—independent of Federal Reserve policy actions—is very difficult. To a considerable degree the Fed produces the seasonal variations that exist in observed  $M_1$ , partly in order to reduce or eliminate seasonal variations in interest rates. Thus, when the Fed publishes historical money stock series, seasonally adjusted by using a "descriptive" seasonal reflecting seasonal patterns in the money stock after Federal Reserve policy actions, users should recognize that such seasonally adjusted data are not necessarily those that were used by Federal Reserve authorities in making their policy decisions. The Fed should also continue to publish seasonally unadjusted data for the monetary aggregates.

## 6 Short-run (transitory) variations in the monetary aggregates

*To highlight the dangers of overemphasizing short-run variations in the monetary aggregates, we recommend that the Fed publish further information on the short-run, nonsystematic or transitory, variability of the monetary aggregates.*

Apart from seasonal and basic longer-term movements, the monetary aggregates are subject to a variety of short-term day-to-day and week-to-week variations that arise from fluctuating payments among the Treasury, the public, and the banks, items in process of collec-

tion, reporting and tabulating errors, and the like. Our analysis suggests that such day-to-day transitory variations alone can introduce a substantial, nonsystematic variability, or error, in reported growth rates. From month to month the transitory component in the annualized growth rate of  $M_1$  is likely to exceed  $2\frac{1}{2}$  percentage points one-third of the time, from quarter to quarter, to exceed  $\frac{1}{2}$  percentage point one-third of the time. The comparable transitory component, or error, in  $M_2$  will be about half as large. Users should be aware of the dangers of placing too much emphasis on reported short-term variations in the monetary aggregates, especially on less than quarterly changes.

## 7 Recent financial developments and the monetary aggregates

*Recent financial developments suggest the possibility of radical changes in the Nation's payment order or withdrawal accounts and we do not recommend changes in the definition of  $M_1$  or other monetary aggregates now, we do recommend that the Federal Reserve begin to collect and publish systematically data on new close substitutes for demand deposits (such as negotiable order of withdrawal and payment order of withdrawal accounts and overdraft facilities if possible), and that it develop experimental aggregates that combine demand deposits with those savings accounts that are readily convertible to a demand basis.*

Financial innovation and regulatory changes have been rapid in recent years. Combined with the prohibition of payment of explicit interest on demand deposits and other regulatory changes, high interest rates have stimulated the development of various close substitutes for demand deposits. These substitutes are still relatively small in dollar amounts, but they may be beginning to have substantial effects on the rate at which the currently defined money stock turns over. If these developments continue, they may change substantially the historical

relationships between the present monetary aggregates and aggregate demand for goods and services. Thus, the Federal Reserve and other supervisory agencies should begin now to col-

lect and analyze the data needed to understand these new relationships as they develop, including the possible introduction of new aggregates to take new developments into account.

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## Conceptual and Definitional Issues

In conducting monetary policy, the Federal Reserve should use as an intermediate target that monetary total (aggregate), or those totals, through which it can most reliably affect the behavior of its ultimate objectives—the price level, employment, output, and the like. Which total or totals best satisfy that requirement depends in turn on (1) how accurately the total can be measured, (2) how precisely, and at what costs including unwanted side effects, the Fed can control the total, and (3) how closely and reliably changes in the total are related to the ultimate policy objectives.

If a total cannot be measured, it cannot be used effectively as an intermediate target for policy purposes. At the same time, for the purposes of Federal Reserve policy there is little point to measuring precisely some total that the Fed cannot control or that has no influence on ultimate policy objectives. Accordingly, there is no way to tackle the problem of measurement without implicitly or explicitly reaching conclusions about the feasibility of control and the closeness of influence. We have done so mostly by relying on our prior general information and the prevailing views of experts on monetary policy rather than by special studies, though we have made some special calculations in trying to decide how to handle borderline items.

To avoid having to go more deeply into the problems of control and influence, we have not tried to select a single aggregate but rather have dealt with a number of alternative monetary aggregates and examined how the measurement of those aggregates could be improved.

Considerations of feasibility have narrowed our task by ruling out some totals that economic analysis suggests would be superior to

the totals that can actually be measured. Here the main issue is between measuring monetary totals (1) as they are recorded on the books of the ultimate owners or holders of money (individuals in their capacity as ultimate wealth holders, business enterprises, governmental bodies other than the monetary authorities), or (2) as they are recorded on the books of financial institutions.

On analytical grounds, we would prefer to measure the total amount of currency and various categories of deposits held by the “public” in whatever form or institution or place. If possible, of course, it would be desirable to subdivide monetary totals among various groups and locations of holders. However, it is currently impractical to measure such totals directly. The basic available data are reported by the issuers of U.S. currency (the U.S. Treasury and the Federal Reserve) and by the financial institutions whose liabilities are generally labeled “deposits” (commercial banks, mutual savings banks, savings and loan associations, and credit unions), rather than by the owners of the currency and deposits.

As a result, we have been forced to restrict ourselves to totals that can be constructed from the books of financial institutions. That is, we have been forced to accept data corresponding to the characteristics and national location of the issuers of currency and of the financial institutions, or corresponding to the character of their liabilities or assets, rather than, as we should prefer, data directly from money holders on their monetary assets. However, the data from the issuers do permit some distinctions among holders, so one important question is what holders of money to include in the public.

In considering conceptual and definitional issues, four topics deserve particular attention (1) alternative aggregates, (2) effects of recent financial developments on these totals, (3) problems of consolidation of accounts, and (4) how to define the public

### Alternative aggregates

Three distinctive bases for defining *monetary* totals have played an important role in monetary literature. In addition, there has been much interest in *credit*, as distinguished from *money*

Measuring credit totals involves problems that differ from those in measuring monetary totals. For banks, information on credit totals comes from the asset side rather than from the liability side of the balance sheet. Further, "bank credit" can be viewed as part of much broader totals, which could also include commercial paper, Treasury bills, longer-term Government securities, corporate bonds, mortgages, and so on in great diversity. Some elements of these totals are held by institutions whose liabilities are included in one or another monetary total, other elements are not. In our judgment, there is substantial informational value in credit totals and components, but we have not been able to consider their measurement adequately. Hence, we make no specific recommendations concerning them.

With respect to monetary aggregates, one basis for defining such a total is to regard money as corresponding to assets that are generally used to discharge obligations and that are not the explicit liability of nongovernmental entities in the society. Traditionally such assets have corresponded to specie. In the United States today they correspond primarily to the non-interest-bearing fiat issues of the ultimate monetary authority. The terms "high-powered money" and "monetary base" have been used to refer to this total. We shall refer to it as "the base."

For the United States today the base includes all currency outside the Federal Reserve and the Treasury plus all bank deposits at Federal

Reserve Banks. It is the total among those considered here that can probably be most accurately measured and most precisely controlled by the Fed. There are a few (but relatively minor) ambiguities about its measurement. Moreover, Federal Reserve control is not complete and immediate. Commercial banks may, at their option, borrow some additional reserves at the Fed. The lagging of actual reserve requirements behind the deposits to which they are related means that the Fed in effect must provide additional reserves when banks run short, since it is impossible for the banks to alter the deposits they had held 1 or 2 weeks previously. But the major defect of the base arises from the widespread belief, based on both empirical studies and theoretical analyses, that this total in the United States is less closely and reliably linked to the ultimate objectives of policy (employment, prices, and so on) than are some other aggregates. However, there are some bits of evidence in the opposite direction, and this total does have the great advantage of being less subject to influence by financial innovations than are broader totals. Hence, we recommend that the Fed regularly publish figures on the base, as defined above—probably on a weekly basis along with the current money stock data.

A second basis is to regard money as corresponding to assets generally used to discharge debts, that is, those assets that are used as "media of exchange." This criterion is sometimes hard to apply (for example, is a \$10,000 bill to be regarded as a medium of exchange? are postal money orders?), but these problems of classification are, in practice, minor. There is little dispute that—at the present time in the United States—currency, commercial bank demand deposits, and traveler's checks are the only major items generally used as media of exchange and that the bulk of these items can be so used. However, as we note in the next section, recent developments—such as "checkless" computerized payments and, in effect, permitting checks to be written on savings accounts at commercial banks, savings and loan institutions, and mutual savings banks—may

be changing this situation so substantially as to require a revised definition of the major monetary aggregates

The symbol  $M_1$  is generally used to refer to this concept of money as a medium of exchange. Problems of measuring  $M_1$ , as it has ordinarily been defined, arise primarily from the necessity of estimating the amounts held from bank records, these difficulties will be considered later. Problems of controlling  $M_1$  arise from changes in the ratio of currency held by the public to its demand deposits and from changes in the ratio of demand deposits to bank reserves, the latter in turn reflect shifts of funds among different categories of bank deposits, changes in excess reserves held by banks, and the lag in reserve requirements. Such changes alter what is termed the "money multiplier"—that is, the ratio of  $M_1$  to the base. They also arise from inadequate data on non-member banks, and on cash items and related transactions. Most students regard  $M_1$  as more closely and more reliably related to ultimate objectives than is the base. But there is some concern that financial innovation is changing, and probably loosening, the relationship between  $M_1$ , as it is ordinarily defined, and such ultimate policy goals as employment, output, and prices.

A third basis is to regard money as assets that serve as a "temporary abode of purchasing power"—in which sellers of goods, services, or financial assets hold the proceeds in the interim between sale and subsequent purchase of other goods, services, or assets—and that are, or are readily convertible into, media of exchange. This liquid asset concept is regarded by some scholars as coming closest to capturing the essential feature of money and as more closely and reliably related to ultimate objectives than the other concepts.

Unfortunately, this concept has the most ambiguous empirical content of the three measures. It can correspond to  $M_1$  plus time and savings deposits of commercial banks other than large certificates of deposit (CD's) (now defined as  $M_2$ ), or  $M_2$  plus deposits at mutual savings banks, savings and loan associations,

and credit unions (now defined as  $M_3$ ), or either  $M_2$  or  $M_3$  plus large CD's (now defined as  $M_4$  and  $M_5$ ). Each of these totals, in turn, could be constructed differently by, for example, distinguishing time from savings deposits, as suggested in the following sections. And still broader aggregates could be constructed by including such items as Treasury bills, Series E Government bonds, cash surrender value of life insurance policies, and so on. In general, though by no means uniformly, the broader the concept, the greater the problems of measurement and control.

### Recent financial developments

This is a particularly difficult time at which to determine definitively the precise empirical counterparts to the alternative aggregate concepts listed in the preceding section. Financial innovation and regulatory changes affecting the payments mechanism have been particularly rapid in recent years, stimulated by the very high rates of interest. Given the prohibition on the payment of explicit interest on demand deposits and the inability of savings and loan associations, mutual savings banks, and credit unions to hold demand deposits, these high interest rates have stimulated the development of substitutes for demand deposits. Combined with the differential ceilings on interest rates that may be paid on various categories of time and savings deposits and the changes in these ceilings over time, the high interest rates have stimulated differentiation of deposit categories and alterations in their characteristics.

The base is the only total about whose empirical counterpart these developments raise no problems, though, of course, these developments may have affected the demand for the base. However, future developments may affect this concept as well. For example, some economists have proposed that the Federal Reserve pay interest on deposits at Federal Reserve Banks. If this were to occur, the question would arise as to whether the base should be narrowed to correspond solely to non-interest-

bearing currency or broadened to include other interest-bearing obligations of the Government

### *Certificates of deposit*

The large negotiable CD's introduced in the 1960's seem very different from the earlier time and savings deposits at commercial banks and more like open market commercial paper. Accordingly, some scholars have eliminated them from the monetary totals that they have used in their studies, and the Fed has done the same by excluding marketable CD's in denominations larger than \$100,000 from the time and savings deposits that it adds to  $M_1$  to obtain  $M_2$ . However, the formal distinction between negotiable and nonnegotiable seems largely technical, since banks generally permit large purchasers to convert from one to the other at will. Moreover, the \$100,000 division is clearly arbitrary and has a different significance at different price levels. Hence, the present procedure must be regarded as makeshift until enough evidence is accumulated to permit a more satisfactory resolution.

We have made a number of tests to determine whether  $M_2$  or  $M_4$  is more closely related to nominal income and to the Fed's ultimate policy objectives. On the whole, the evidence favors  $M_2$ . But the evidence is weak, and it may be that the results reflect simply the transitional effect of the introduction and rapid growth of CD's. Negotiable CD's have been important for too few years to provide an adequate test. Hence we recommend emphasizing  $M_2$  and  $M_3$ , but continuing to monitor the performance of  $M_4$  and  $M_5$ .

### *NOW, POW, and similar accounts*

There has recently been a proliferation of experiments designed to provide the equivalent of checking services to holders of what are technically classed as savings deposits at commercial banks, mutual savings banks, savings and loan associations, and credit unions, or of accounts at so-called money market funds. The

NOW (negotiable order of withdrawal) accounts permitted in Massachusetts and New Hampshire are a dramatic example. In addition, some savings and loan associations have made arrangements to make telegraphic transfers of Federal funds at the order of holders of larger accounts, and banks have been permitted by the Federal Reserve and the FDIC to transfer savings to demand accounts on telephonic order since April 1975. Many of the rapidly expanding money market funds, which belong to a group of institutions heretofore entirely outside the scope of the usual monetary totals, have arranged with cooperating banks to permit the transfer of funds by check or its equivalent. Moreover, since November 1975 profit-making business corporations have been permitted by the Federal Reserve and the FDIC to hold savings accounts of up to \$150,000 per account, and they apparently shift funds frequently between demand and savings accounts.

To date, NOW accounts and closely related substitutes for demand deposits apparently total only about 1 per cent of  $M_1$ , but they are increasing rapidly in importance. Estimates of such accounts are now included in  $M_2$  and  $M_3$ . Some observers believe they should be included in  $M_1$ . In our judgment it is too soon to make a definite decision on how to treat these accounts, especially since there may be substantial changes in their character or significance in the next few years, including possible changes in regulations applying to them and related bank deposits. Because many such substitutes are claims on institutions not subject to regulation by the Federal Reserve, collection of data on them will require the active cooperation and assistance of other Government agencies that now obtain data from the relevant institutions. We urge such agencies to cooperate with the Fed for this purpose.

If present trends continue, we suspect that within not more than 2 or 3 years it will be desirable for the Federal Reserve to re-examine the treatment of such accounts and possibly to alter the definitions of some of the present aggregates to take them more specifically into account.



### *Distinction between time and savings accounts*

The development of CD's on the one hand and of substitutes for demand deposits on the other, plus the differential ceilings on interest rates that may be paid on savings and time deposits, have increased the practical importance of the distinction between time and savings accounts. This distinction was for many years purely formal, and such accounts are combined in such aggregates as  $M_2$  and  $M_3$ . But more recently, the distinction has become more significant. Since July 1973, banks have been required to impose relatively large interest penalties on the withdrawal of time deposits before maturity, and as a result holders of such deposits now have reason to take the maturity more seriously. In effect, savings deposits have become much more similar to demand and checking deposits, as noted above, and time deposits more similar to securities.

Thus, it may well be that a better empirical counterpart than  $M_2$  or  $M_3$  to the concept of a temporary abode of purchasing power will be totals that add to  $M_1$  only savings deposits at commercial banks as an alternate to  $M_2$ , and at mutual savings banks and savings and loan associations as an alternate to  $M_3$ , and that exclude time deposits at both. Or, it may be that such a demand-plus-savings-deposit total will be a replacement for  $M_1$ , corresponding to the "media of circulation" concept, and that a broader total, which includes not only time deposits but also CD's, money market funds, and perhaps other items, will be a replacement for  $M_4$  and  $M_5$  to correspond to the concept of a "temporary abode of purchasing power."

Here again, it is too soon to recommend a change. But we commend the Board's staff for some preliminary studies that explore new totals constructed along these lines. We recommend strongly that such studies be continued, and that the reconsideration of monetary aggregates some 2 or 3 years from now as we suggested above be accompanied by a parallel re-

consideration of the treatment of savings and time deposits.

### *Nonbank traveler's checks*

Liability for traveler's checks issued by banks is now included in  $M_1$  as part of demand deposits. In principle, liability for traveler's checks issued by nonbanks should also be included, but it is not, simply for lack of data. This is not a new problem, but it is included here because it is the same kind of problem as those raised by recent financial innovations. However, its importance is changing, partly because of widening competition in the issuance of traveler's checks. Unfortunately, we see no practical way to remedy this defect now.

### *Credit cards and the "checkless society"*

An increasing volume of purchases is being made on credit cards, and direct credits of wages and salaries to bank accounts and debits to purchasers' bank accounts by sellers through computer networks will probably spread in the years ahead, perhaps moving the economy toward an increasingly "checkless society" in the foreseeable future. Insofar as credit-card purchases and the elimination of physical bank checks merely provide more convenient and efficient means of transferring demand deposits, they do not call for any redefinition of the money stock—although they may lead to a higher velocity of circulation. Insofar as they actually involve creation of new transferable money by sellers who temporarily increase the spending power of buyers, they certainly increase the volume of credit, although they do not increase  $M_1$  as now defined or as it might be defined in response to the financial developments so far considered.

If credit cards and a checkless society largely supplant present methods of payment, it will become desirable to redefine  $M_1$  and the other deposit totals based on it in a more fundamental way. For the time being, however, we recommend no change in the definition of the totals based on the growing use of credit cards and direct crediting and debiting of deposit

accounts through computerized systems that eliminate or postpone use of physical checks. Increasing use of these payments methods may raise measurement problems because they may increase such items as bank float (considered later) and interbank deposits relative to net holder balances, but they do not yet raise major definitional problems.

### Problems of consolidation

A major technical problem in constructing estimates of  $M_1$  through  $M_2$  is the correct consolidation of the accounts of individual financial institutions and their depositors. The most obvious example is interbank deposits. The sum of all deposit liabilities on the books of banks will exceed the corresponding assets of the nonbank public by the deposit liabilities of some banks to other banks. Consolidating, rather than simply combining, the books of the banks requires the elimination of such interbank deposits. This general principle is clear, but its application raises difficult problems, which we will consider after first dealing with bank float.

### Bank float

A less obvious example is cash items in the process of collection. When  $X$  deposits to his account in Bank A a check drawn by  $Y$  on Bank B, he is given immediate credit by Bank A, which matches its increased liability by an increase in the asset category, CIPC. Bank A forwards the check to a Federal Reserve Bank for collection. The Federal Reserve Bank credits Bank A's account at the Federal Reserve Bank (Bank A in turn transfers the corresponding sum "items in process of collection" to "deposits at Federal Reserve Bank"), debits Bank B's account, and forwards the check to Bank B, which subsequently debits  $Y$ 's account there.

During any time interval that elapses between crediting the check to  $X$ 's account and debiting it to  $Y$ 's account, total deposit liabilities in the system are higher in this amount by the amount of the check. In the usual

terminology, that sum is double counted by the amount of the bank float. This assumes that  $X$  views the check as added to his cash balance as soon as he deposits it and that  $Y$  deducts the check from his balance when he estimates that  $X$  will have deposited it. This is by no means the only possible assumption. Another is that  $Y$  deducts the check when he writes it—which adds mail float to bank float as double counting. The other extreme is that  $Y$  does not deduct the check until he estimates it has been debited against his account—in which case check-kiting offsets bank float.

There is no completely convincing evidence as to how transactors view the timing of debits and credits to their accounts, but various earlier studies have suggested that deducting bank float (but not mail float, which in any case cannot be estimated satisfactorily) produces an  $M_1$  total that is more closely related to nominal national income (an intermediate objective of Federal Reserve policy) than is the total obtained without the deduction. Special calculations made at the request of the Committee gave the same result. Hence we have accepted this concept in analyzing the problem of bank float.

The estimation and deduction of bank float raise measurement problems because of the different treatment of similar items by different banks (for example, entering a check en route to a correspondent bank as "due from banks" rather than CIPC) and because of the possible inclusion in CIPC of items that have no counterpart in the deposit total and hence cannot be regarded as double counting (for example, food stamps or checks on other banks whose deposits are already deducted when interbank deposits are subtracted). These measurement items are discussed further in Section 4.

### "Bank" versus "public"

The various aggregates implicitly involve drawing different lines between banks and the public, which in turn call in principle for different consolidations of accounts. The most

obvious example is the difference between  $M_4$  and  $M_5$ .  $M_4$  treats commercial banks as banks but mutual savings banks, savings and loan associations, and credit unions as part of the public. Hence, deposits of the thrift institutions at commercial banks are not treated as interbank deposits and are not excluded in estimating  $M_4$ . They do not duplicate any of the commercial bank liabilities to the public included in  $M_4$ . For  $M_5$ , on the other hand, the deposits of the public (now defined to exclude the thrift institutions) at the thrift institutions are included. But it would be double counting to include both these deposits and the deposits of thrift institutions at the commercial banks. These should be regarded as interbank deposits—a treatment that is not now followed.

This problem arises for every total, and we shall consider them one at a time, after which we shall give our recommendations for all totals.

#### Base

For the base, only the Federal Reserve and the Treasury are banks, everything else is the public. Hence, the base correctly eliminates only Treasury deposits at Federal Reserve Banks and currency held by the Treasury and the Federal Reserve. It correctly includes all cash in the vaults of commercial banks and thrift institutions and all non-Treasury deposits at Federal Reserve Banks because these do not duplicate any other element in the base.

#### $M_1$

In some ways  $M_1$  raises the most troublesome problem. For this total, banks include, in addition to the Federal Reserve and Treasury, only that part of commercial banks that corresponds to their demand deposit liabilities. Any vault cash held by commercial banks on account of demand deposit liabilities should be deducted in computing the currency holdings of the public since the public holds this cash indirectly through its demand deposit holdings at commercial banks, and it should

not be counted twice. Similarly, deposits held by commercial banks at other commercial banks or at the Federal Reserve on account of demand deposits should be treated as interbank deposits since they do not correspond to liabilities to the public.

On the other hand, vault cash or deposits at other banks held by commercial banks on account of time deposits are, for the  $M_1$  total, in the same category as cash or deposits at other banks held by mutual savings banks or savings and loan institutions. They do not duplicate any other item included in  $M_1$  and hence should not be subtracted.

The conceptual issue is clear. However, it is not easy to carry out the correct treatment in practice because there is no way to connect particular asset items with particular liability items. How can we determine what fraction of commercial banks' vault cash and deposits at other banks is held on account of demand deposits and what fraction on account of other liabilities? Because of this difficulty, the distinction is not made now. All vault cash and deposits of commercial banks at other banks are subtracted in calculating  $M_1$ . The result is, on this account, an underestimate of the conceptually valid total.

#### $M_2$

The part of bank vault cash and of deposits at other banks held by commercial banks on account of large negotiable CD's should not be, but is, subtracted in calculating  $M_2$ . The error is in the same direction as for  $M_1$  but of course it is much smaller in magnitude.

#### $M_3$

The cash held by thrift institutions and then deposits at commercial banks other than any large CD's held should be subtracted in computing  $M_3$  because these items duplicate their liabilities to the public. Since this is not done now,  $M_3$  is accordingly overstated.

#### $M_4$

This total is the only one other than the base that is now conceptually correct. For this total,

all vault cash and deposits at other banks held by commercial banks should be and are subtracted

### $M_5$

Like  $M_3$ , the total is currently overstated because vault cash and deposits of the thrift institutions at other banks are not subtracted. The accounts of the thrift institutions are combined, rather than consolidated, with the accounts of the commercial banks.

### Recommendations

We recommend that in computing  $M_3$  and  $M_5$  the Federal Reserve consolidate rather than combine the accounts of commercial banks and thrift institutions. This means that currency holdings of thrift institutions plus their deposits at commercial banks should be subtracted from  $M_3$  as currently calculated, and that this sum plus large CD's held by thrift institutions should be subtracted from  $M_5$  as currently calculated.

In order for this consolidation to be feasible, it will be necessary that the agencies now collecting data from thrift institutions require them to report a more detailed breakdown of the category "liquid assets" than they now report. At a minimum, information will be required separately on currency plus demand and time deposits at commercial banks, large CD's, and other liquid assets.

While we recognize that  $M_1$  and  $M_2$  as currently calculated are not conceptually precise, we do not propose any change in present procedures because of (1) the arbitrariness of any division of commercial bank holdings of currency and deposits at other banks into the parts held on account of demand deposits, large CD's, and other time and savings deposits, and (2) the belief that the error involved in the present procedure is reasonably stable over time and hence does not affect seriously estimates of changes over time.<sup>2</sup>

<sup>2</sup>Dissenting footnote by Milton Friedman, in which Phillip Cagan concurs. I believe it would be desirable to attempt to correct the error in  $M_1$  and  $M_2$ , despite

### How to define the public What holders?

As currently defined,  $M_1$ ,  $M_2$ ,  $M_3$ ,  $M_4$ , and  $M_5$  all attempt to measure holdings of the relevant categories of assets by the nonbank public—individuals, partnerships, corporations (IPC), States, counties, municipalities, and Government agencies other than the Federal Reserve and the Treasury—with some exceptions. Though holdings of the US Treasury and the Federal Reserve are excluded as holdings of banks rather than of the public, minor amounts of currency held by US Government agencies are included. The totals include currency held abroad and deposits held in the United States at commercial banks and Federal Reserve Banks by the foreign public, foreign banks, and foreign governments, central banks, and international institutions. They exclude dollar deposits held by the US public at banks (including US banks and branches) located in foreign countries or in US territories and possessions.

Some of the deviations of current practice from the ideal concept are necessitated by lack

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the two valid points made in this paragraph. The error is substantial in absolute size and unless an attempt is made to eliminate it, we shall not know when and if it varies over time.

The procedure I recommend as a minimum is to allocate to deposits other than demand deposits, in computing  $M_1$ , an amount of cash and deposits at other banks equal to required reserves on deposits other than demand deposits, and in computing  $M_2$ , to allocate to large CD's required reserves on such CD's. The implicit assumption that banks hold zero precautionary or free reserves on account of deposits other than demand deposits is no doubt extreme, so not all error would be eliminated, but it seems to me far more reasonable than the current implicit assumption that they hold zero required reserves against these deposits. A more serious error is to regard no demand deposits at other commercial banks, and no items in process of collection, as allocable to deposits other than demand deposits.

The amounts involved are substantial. For example, required reserves on time and savings deposits in June 1975 were more than \$10 billion when  $M_1$  as currently estimated totaled a bit under \$300 billion. Hence, the understatement of  $M_1$  on this account is a minimum of 3 per cent.

True, this understatement is not likely to change much over time, but also the cost of introducing this correction into the estimates, if done as I suggest, is trivial. The required information is all now available, so only extra computation is required.

of data. This is clearly the case for currency held abroad, which cannot be estimated separately from that held in the United States. With respect to the other items, current practice raises two main issues that we wish to explore: (1) treatment of U S Treasury and other Federal Government agencies, and (2) treatment of deposits of foreigners in the United States and of dollar deposits of U S residents outside the United States.

### ***Federal Government***

Insofar as the U S Treasury is part of the ultimate monetary authority, its accounts should be consolidated with those of the Fed and its holdings excluded as part of bank assets and of  $M_1$  through  $M_5$ . The real question arises in regard to the U S Treasury as an operating entity and about other Federal Government operating agencies. On the whole, we recommend the continued exclusion, so far as possible, of all U S Government holdings of currency and deposits on two grounds. First, it is somewhat arbitrary to separate the holdings of the Treasury in its capacity as an ultimate monetary authority from its holdings as an operating agency or as the fiscal agent for other operating agencies. Second, even as an operating entity, the relation between money balances of the Federal Government and how it spends the money cannot be regarded as homogeneous with this relation for the rest of the public, given the Federal Government's unique power to create money.

### ***Foreign deposits in the United States and dollar-denominated deposits abroad***

U S currency and deposit liabilities of banks in the United States are held by a variety of domestic and foreign holders. Furthermore, in recent years there has been a vigorous growth of what may be labeled "offshore" dollar deposits, that is, dollar-denominated deposits that are liabilities of foreign branches of U S banks or foreign banks located abroad. These deposits are also held by a variety of domestic and foreign holders. Table 1 portrays systematically these various categories of dollar-

denominated deposits as of December 31, 1974, insofar as the information is available. The table does not include U S currency, since no reliable information is available on the amount and distribution of such currency held domestically and abroad.

### **Components presently included in the aggregates**

As presently defined,  $M_1$  includes, first, all outstanding U S currency outside the Treasury, Federal Reserve Banks, and U S commercial banks. Thus,  $M_1$  includes currency held abroad by the foreign public and foreign banks, there being no information for excluding this component even if it were deemed desirable to do so.  $M_1$  includes, second, all demand deposit liabilities of banks in the United States (including not only U S banks but also branches and agencies of foreign banks) except those due to the U S Government and to other banks in the United States (so-called interbank deposits). It also excludes nondeposit liabilities of U S banks to their related head offices or branches abroad (column 2 of Table 1) that may serve functions similar to interbank demand deposits. Thus, as presently defined,  $M_1$  includes the deposits at U S banks of *all nonresidents*, including foreign governments and (unrelated) foreign banks, even though deposits of the U S Government and U S banks are excluded.

The broader aggregates, too, are defined as including the deposits at U S commercial banks of foreign nonbanks, official institutions, and (unrelated) commercial banks and (for  $M_3$  and  $M_5$ ) such savings accounts as these organizations may have at U S savings institutions.

No dollar-denominated deposits at banking offices outside the United States, covered in the right-hand portion of Table 1 on page 17, are now included in any of the standard U S monetary aggregates.

### **Criteria for recommendations**

We have taken a fresh look at the current definition of the aggregates with two questions

in mind. Whether it might be appropriate to change this definition with regard to the types of deposit holders and/or types of issuers to be included in one or more of the aggregates, and whether it would be desirable to collect additional information, on a continuing basis, for any types of dollar-denominated deposits.

In reaching our recommendation as to which of the entries in Table 1 should be included in the aggregates at this time, we have been guided by two main criteria:

1. Would inclusion of the category make the U.S. monetary aggregates more useful to monetary policymakers concerned with setting, implementing, or monitoring policies aimed at achieving final policy objectives, such as prices, output, and employment?

In an open economy (one that has trade and financial relationships with other economies), no purely domestic definition of the money stock can logically be completely satisfactory, just as the monetary authorities in such an economy cannot completely disregard foreign trade and capital movements in making their stabilization decisions. How much weight monetary authorities may wish to put on such foreign transactions will presumably depend on how important these transactions are relative to domestic economic activity in the country concerned. The weight may also vary according to currently accepted practices regarding the stability or variability of exchange rates. The more weight monetary authorities place on international considerations, the less satisfactory any domestic definition of the money stock will be as an intermediate target for monetary action aimed at influencing final objectives such as employment and prices, since in an open economy there is no way of neatly separating the interacting domestic and international effects of monetary policies.

Unfortunately, no precise tests are feasible to determine how useful different concepts of money are as intermediate target variables for monetary policy actions in the United States or in other open economies. Given the theoretical difficulty of prescribing the "ideal" inclusion of foreign—or international—money in the U.S. money stock, the practical diffi-

culties in obtaining the desired data even if they could be conceptually defined, and the relatively small role played by international transactions in the U.S. economy, as a practical matter we recommend use of a concept of money focused primarily on the domestic economy. For the American economy, the following operational criteria seem reasonably consistent with a broad spectrum of views about the nature of the transmission mechanism between money and various final economic objective variables, including the views that money affects income directly and that it works through the links of market interest rates and the availability of credit:

(a) If the demand for dollar deposits by any group of holders is controlled primarily by forces other than those that control the demand for money by the U.S. public (basically the volume of domestic transactions, wealth, and interest rates), there is a *prima facie* case for the exclusion of that group of holders and holdings. For example, if dollar deposits of foreign central banks in the United States are controlled by fluctuations in reserves and by balance of payments considerations, rather than by their association with payments in U.S. goods and securities markets, then these deposits should be excluded from the U.S. monetary aggregates. (b) A closely related criterion is whether some broad measure of U.S. income is more closely associated with  $M_1$  defined to include or exclude the given component. Generally, criteria 1(a) and 1(b) will yield the same conclusion, although this may not always be the case. (c) Beyond these tests, as a practical matter, if a category represents at all times a small and reasonably stable proportion of the aggregate, its treatment will not have an important effect on the usefulness of the resulting aggregate.

2. Costs of data collection are relevant, and such costs should be considered in relation to the expected usefulness of data collected.

## Recommendations

Relying primarily on these criteria, the Committee makes the following recommendations:

**TABLE 1 Dollar Liabilities of Banks and Banking Offices, December 31, 1974**  
In billions of dollars

Item	In the United States <sup>1</sup>				Outside the United States		
	Gross demand deposits	Nondeposit liabilities to related bank offices abroad	Gross time and savings deposits (including CD's) and similar accounts		Banks in 8 European countries reporting to BIS <sup>2</sup>	Foreign branches of U S banks <sup>3</sup>	
			Commercial banks	Savings institutions		8 Euro pean countries	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
To U S residents							
Nonbanks	277		404	} 369	4	3	3
U S Govt	5		( <sup>4</sup> )		( <sup>4</sup> )	( <sup>4</sup> )	( <sup>4</sup> )
Banks	38		9		9	1	5
To Non U S residents <sup>5</sup>							
Nonbanks	3		5	} 369	28	9	3
Official institutions	3		12			14	3
Commercial banks							
Unrelated	8		2	} 124	} 32	} 31	
Foreign branches of U S banks		4					
Foreign banks with agencies and branches in United States		14					

<sup>1</sup>Including U S branches and agencies of foreign banks (Their liabilities to head offices and other related offices abroad are in column 2 their deposit liabilities to various holders in columns 1 and 3)

<sup>2</sup>Including U S bank branches in those countries Data exclude interbank liabilities of one bank to another within the same country

<sup>3</sup>Data include interbank liabilities of a branch to other banks within the same country The breakdown of liabilities to U S residents between banks and nonbanks is approximate

<sup>4</sup>Less than \$1 billion

<sup>5</sup>Data shown in columns 1 through 3 are from (monthly) reports to U S Treasury for balance of payments statistics Daily data are also available for demand deposit liabilities to the three categories of U S residents, to foreign official institutions, and to

unrelated foreign banks, but not for demand deposits of foreign IPC

SOURCE—Seasonally unadjusted single date figures from the call report for domestic U S banks and U S branches of foreign banks, from Federal Reserve data (forms FR 886(a) and (b)) for U S agencies of foreign banks, and Edge Act corporations engaged in banking, from Treasury balance of payments data for liabilities to related bank offices and for CD's issued to foreign holders, from data of National Association of Mutual Savings Banks, Federal Home Loan Bank Board, and National Credit Union Administration, from BIS Annual Report and unpublished breakdown for Euro dollars held in United States and from Federal Reserve data (form FR 502) for liabilities of foreign branches of U S banks

### Foreign deposits at U S domestic banks

As in the case of domestic transactors, one can distinguish three types of foreign depositors (1) private nonbanks (IPC), (2) national governments and official institutions, and (3) commercial banks

*Deposits of foreign individuals, partnerships, and corporations* We recommend continuation of the present practice of including IPC deposits in  $M_1$  and the other aggregates This recommendation rests on a combination of criteria 1 and 2 Empirical tests for criterion 1(a) failed to provide clear support for either inclusion or exclusion of this component Tests for criterion 1(b)—comparing the correlation of changes in income with distributed lags of changes in  $M_1$  including and excluding foreign IPC deposits as estimated from balance of payments data—were also not very conclusive Including foreign IPC deposits raises the correlation between  $M_1$  and income—suggesting that these deposits be included—though the difference is small Moreover,

foreign IPC deposits are small (criterion 1(c)), in recent years they have accounted for less than 1 per cent of  $M_1$  or other relevant aggregates, so handling them in the cheapest way seems appropriate And the cost of eliminating them from domestic IPC deposits on a daily-average basis would, according to the staff, be substantial

*Deposits of foreign central banks and other official institutions* We recommend that these deposits of foreign central banks and other official institutions hereafter be omitted from  $M_1$  and the other monetary aggregates They are small compared with the relevant monetary aggregates—such demand deposits are currently about 1 per cent of  $M_1$ , while total deposits (including CD's) are about 2 per cent of  $M_4$ , having increased sharply in the last 2 years Thus, their treatment is not an issue of major importance Nonetheless, we feel they should be excluded, though this recommendation does not rest on a simple analogy with the treatment of the deposits of the U S Government It rests, instead, primarily on criterion 1

The term "foreign official" covers a diverse array of transactors, including central banks, governments and their diplomatic and consular establishments, purchasing missions, and international organizations such as the United Nations. The deposits of foreign central banks and exchange stabilization funds are not used to any substantial extent for payments in goods, services, and private capital markets in the United States, though they may be related to U.S. interest rates, at times sizable shifts apparently unrelated to this country's gross national product (GNP) occur between these deposits and foreign central banks' holdings of Treasury bills and other securities. For the other foreign official institutions, spending behavior analogous to that of the U.S. public is conceivable. However, our empirical tests indicate that only about three-fourths of the movement of foreign official deposits (as measured by the variance) is accounted for by GNP, personal income, and interest rates, and even the latter effect is not clear cut, by contrast, those variables explain 99 per cent of the variance for  $M_1$  as now defined. Thus, criterion 1(a) points marginally to the omission of this component.

Empirical tests using criterion 1(b) point slightly in the opposite direction. Inclusion of foreign official institutions in  $M_1$  increased the correlation with income, although the increase was very small. On balance, then, the empirical evidence points marginally toward the elimination of foreign official deposits, and this conclusion is strengthened by the potential for erratic movements of deposits of foreign official institutions.

*Foreign commercial banks' deposits in the United States.* These claims of foreign commercial banks on banks in the United States, which amounted to \$28 billion at the end of 1974, consist of two distinct components. The largest—not now included in the monetary aggregates—includes nondeposit liabilities of U.S. banks to their foreign branches, and liabilities of branches or agencies of foreign banks in the United States to their head offices or other offices abroad (bottom entries in column 2 of Table 1). We recommend continued

exclusion of these liabilities on the general principle of excluding from the aggregates claims and liabilities between branches of the same bank.<sup>3</sup>

The other component consists of deposit liabilities of banks in the United States to unrelated foreign banks, shown as the last items in columns 1 and 3 of Table 1. Such demand deposits, which are now included in  $M_1$ , have grown rapidly in recent years and represent by far the largest portion of foreign demand deposits in the United States (about 3 per cent of  $M_1$ ). Empirical tests for criteria 1(a) and 1(b) failed to produce readily interpretable results, partly because of the extraordinary growth trend of this aggregate. These tests did, however, show that the size of these demand balances varies negatively with short-term U.S. interest rates. Time deposits of unrelated foreign banks in the United States are small.

In an effort to obtain more direct information on the purposes for which these balances are typically held and on the factors controlling their size and movement, we requested the staff to interview officials of major U.S. banks that hold such deposits and also officials of foreign banks. The respondents were consistent in the view that foreign commercial banks maintain demand deposits at U.S. banks primarily to clear their Euro-dollar transactions, and secondarily to settle foreign exchange transactions (of which only a small percentage directly involves the foreign commerce of the United States). Respondents also agreed that the demand deposits maintained in the United States by foreign commercial banks are mainly compensating balances, that is, they are maintained at the level required to compensate the

<sup>3</sup>This general principle is obviously applicable in the case of two domestic offices of the same bank. However, since banking offices abroad can be regarded as belonging to the national banking systems of the countries in which they are respectively located—and also since an increase or decrease in an international claim implies an international capital flow—it can be argued that this general principle is not automatically extendable to the international field. Alternatively, one can start from a presumption that definitions of national money stocks should be consistent with each other and with the definition of a world money stock and logically argue for exclusion of *all* international interbank claims—those on unrelated as well as on related banking offices.



US bank for services rendered to that account. Some (notably Japanese) banks were reported to hold compensating balances against lines of credit, with the deposits playing essentially the role of commitment fees. This information provides a plausible explanation for the rapid growth of foreign commercial banks' demand deposits in the United States during the past decade. It also is consistent with the responsiveness of such deposits to interest rates, noted earlier.

On the basis of this limited evidence, we conclude that the usefulness of  $M_1$  and other aggregates would, on the whole, be improved if foreign commercial banks' demand deposits in the United States were deleted. But we recommend that data on such deposits be published monthly to permit analysts who wish to do so to include them in the money stock.

We recommend a similar exclusion from  $M_2$  and the broader aggregates (and similar separate publication) of foreign commercial banks' time deposits in the United States. This treatment appears desirable for consistency with the exclusion (as recommended above) of the claims of related banks abroad, a large part of which are well known to be interest-bearing placements of funds analogous to interbank time deposits.

### *Dollar deposits at banks in foreign countries*

One of the most striking developments in the international capital markets in the past decade has been the spectacular growth in dollar-denominated deposits at banks outside the United States, including the foreign branches of US banks. These deposits are frequently referred to as Euro-dollar deposits because they were first issued by European banks, though the terminology is misleading because such deposits are now accepted by banks at a variety of other locations.

Unfortunately, existing information about these deposits is limited. The right-hand portion of Table 1 summarizes the available information on offshore dollar liabilities—at banking offices located in eight European coun-

tries and at US bank branches abroad, including Europe (overlapping with the other group) and other areas. The Euro-dollar liabilities of the eight countries have grown more than 16-fold in the past decade, and at the end of 1974 amounted to about \$165 billion. This total includes *interbank* dollar deposits by *commercial banks* outside the country of a reporting bank and *all* dollar deposits of *nonbanks and central banks* (Interbank deposits in dollars *within* the London market are thus omitted.) The total amount of offshore dollar deposits, including the London interbank liabilities and also deposits in Canada, Japan, the Bahamas, Panama, and Singapore, was near \$300 billion at the end of 1974, according to some estimates.

All Euro-dollar deposits are interest bearing and they resemble negotiable CD's issued in the United States in that transactions occur only in large amounts. The bulk of the liabilities are to other banks. Of the \$165 billion Euro-dollar total, for example, four-fifths was interbank. More than nine-tenths of the \$165 billion was due to asset holders outside the United States.

Information on the maturity distribution of Euro-currency liabilities is published from time to time by the Bank of England for the liabilities of banks in the United Kingdom denominated in dollars and other non-sterling currencies (Dollar liabilities make up about four-fifths of these.) Data for February 19, 1975, are summarized in Table 2. As column 4 shows, more than half of the London Euro-currency liabilities to nonbanks outside Britain have remaining maturities of 1 month or longer (The proportion of outstanding deposits having *original* maturities of 1 month or longer would of course be greater.)

Among the various types of offshore dollar deposits, those that deserve closest consideration as candidates for inclusion in some US aggregate such as  $M_4$  or  $M_5$  are the deposits of US residents. As Table 1 shows, at the end of 1974 there were \$6 billion of such deposits outstanding at foreign branches of US banks and \$1 billion at other European banks. There was also some unspecified quantity at foreign banks outside Europe, of which the largest part

**TABLE 2 Maturity Distribution of U K Banks' Non sterling Liabilities, February 19, 1975**

Item	To U K inter bank market	To banks abroad	To U K residents other than banks	To others abroad
	(1)	(2)	(3)	(4)
	Billions of dollars (and dollar equivalents)			
Amounts	39.2	97.3	5.3	19.2
	Percentage distribution			
Maturities				
Less than 8 days	15.4	22.4	50.2	27.6
8 days to less than 1 month	19.7	17.2	19.4	19.0
1 month to less than 3 months	32.2	28.9	14.5	24.6
3 months to less than 6 months	20.3	18.2	5.4	14.5
6 months to less than 1 year	6.9	5.8	3.5	5.6
1 year to less than 3 years	3.0	2.6	3.0	2.9
3 years and over	2.5	4.9	4.0	5.8
Total	100.0	100.0	100.0	100.0

SOURCE—Bank of England *Quarterly Bulletin*, June 1975

is undoubtedly the US dollar deposits in Canada of US residents other than banks, which were \$2 billion at the end of 1974, according to published Canadian statistics. These amounts are not negligible, but in total they still represent only about 1 per cent of  $M_4$  or  $M_5$ .

It is possible that some of these deposits are related to domestic operations but are held abroad because of the higher yield in cash or services thus obtainable. There are, however, reasons for doubting this hypothesis—at least with respect to the portion held at foreign branches of US banks, which is the major part of the total. Since 1969 it has been the stated policy of the Federal Reserve Board of Governors that US banks should not accept deposits from US residents at overseas offices unless such deposits are kept abroad for a definite international purpose. It is known that proceeds of Euro-bond issues by US corporations to finance operations abroad have at times been held in Euro-dollar deposits pending disbursement. When the Federal Reserve staff a few years ago interviewed finance officers of several large corporations with extensive international operations, the respondents reported almost unanimously that they did not

keep abroad balances that were to be used for transactions in the United States.

On the basis of these considerations, we recommend, for the present, continuation of the current practice of not including in US monetary aggregates the dollar deposits held at banks abroad by nonbank US residents. We do recommend, however, that data on such deposits be collected and published monthly and that a breakdown of such deposits by maturities be obtained and published.

As to IPC dollar deposits of foreign businesses and investors held at foreign banks, we have no satisfactory evidence on owners or the purposes for which such deposits are held. Undoubtedly the holders include some foreign affiliates of US corporations, but it is likely that these and other holdings are not significantly related to transactions in the United States. Thus, we recommend that they not be included in the US monetary aggregates.

Some recent research suggests that Euro-dollar deposits, as components of a world monetary aggregate, play some role in determining world output and prices. Moreover, as we emphasized above, in any open economy the line between money held for domestic and international transactions is not a clear one. Thus, we recommend that Euro-dollar deposits be monitored closely, that the summary Euro-dollar data presently collected on a quarterly basis by the Bank for International Settlements for banks in Europe, Canada, and Japan be supplemented periodically by data for banks in other areas, that the quarterly data be broken down by classes of holders (nonbanks, commercial banks, and central banks), and that further information be gathered on the maturity composition of the deposits of nonbanks. This recommendation will permit further study of the data and their relationship to both US and international economic activity.

Finally, on the general principle that monetary aggregates should measure the stock held by the nonbank public, we see no reason to include any interbank offshore dollar deposits in the US aggregates, or, for that matter, in world monetary aggregates.

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## Measurement Issues and Recommendations

### How $M_1$ is constructed now<sup>4</sup>

$M_1$ , the measure of narrow money stock, is defined as currency in circulation plus private demand deposits adjusted at all commercial banks. The components of this measure are shown in Table 3.

#### *Currency*

The currency component of  $M_1$  is relatively easy to construct. It is defined as all currency and coin outside the Treasury, Federal Reserve Banks, and commercial banks. Daily data on currency in circulation outside the Treasury and the Federal Reserve System are available from daily statements issued by the Treasury Department. Since member banks' vault cash can be used to meet reserve requirements, member bank holdings are included on member banks' reports submitted to the Federal Reserve for determination of member bank required reserves. Consequently, the amount of vault cash held at member banks is available on a daily basis, but vault cash at nonmember banks must be estimated.

Estimates of vault cash held at nonmember banks are based on the ratio of vault cash of nonmember banks to vault cash of member banks on call report dates. Currently these benchmark relationships are available four times each year for single days. Prior to March 1973, call report benchmark data were available only twice a year—on June 30 and December 31.

Estimates of the vault cash ratio for each week between call report dates are based on a straight-line interpolation. Weekly estimates

of nonmember vault cash are then derived by multiplying the estimated weekly vault cash ratio times the reported weekly-average member bank vault cash. Monthly-average vault cash is derived from a proration of the weekly estimates. Beyond the latest call report period, the current call report ratio is held constant until another call report is available.

It should be noted that the definition of "currency in circulation outside the Treasury and Federal Reserve banks, less vault cash held at commercial banks" includes an unknown amount of currency held in safe deposit boxes, sent out of this country, or lost or destroyed. Thus, the measure overstates the true amount of currency in circulation in the United States.

#### *Member bank demand deposits*

Data for the demand deposit component of the money stock are not so readily available as for the currency component. The demand deposit component must be constructed from a number of different sources. These sources include data available each day, as of a single day once a week, as of a single day once a month, and as of a single day on call reports available four times each year.

As shown in Table 3, by far the largest part of the demand deposit component of the money stock is demand deposits at member banks. The basic source of data on member bank deposits is the report of deposits submitted by member banks for determination of reserve requirements. Unfortunately, because the purpose of this report is to measure deposits subject to reserve requirements and not deposits to be included in the money stock, the deposit breakdowns available from

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<sup>4</sup>This section is based directly on a statement provided by the Board's staff.

**TABLE 3 Construction of  $M_1$**   
**Amounts in millions of dollars, monthly averages, not seasonally adjusted**

Line, item	Contribution to $M_1$ , December 1974	Source of data
1 Currency in circulation	78,933	Daily data reported by F R Banks and Treasury Dept
2 Less Member bank vault cash	7,488	Daily data reported by all member banks
3 Nonmember bank vault cash	2,399	Estimated, based on member banks and call report data
4 Equals Currency component of $M_1$	69,046	
5 Demand deposits at member banks <sup>1</sup>	151,315	Daily data reported by all member banks
6 Less F R float	2,732	Daily data reported by F R Banks
Plus		
7 Demand deposits at nonmember banks <sup>1</sup>	57,954	Estimated, based on daily data reported by small member banks and call report data
8 CIPC associated with foreign agency and branch transfers	3,519	Daily data reported by foreign related institutions in New York City
9 Demand deposits due to foreign commercial banks	6,004	Estimated, based on single day (Wednesday) data for large banks and call report data for other banks
10 Demand deposits due to mutual savings banks	1,124	Estimated, based on single day (Wednesday) data for large banks and call report data for other banks
11 Demand deposits due to banks in territories and possessions	116	Estimated, based on call report data
12 $M_1$ type balances at foreign related institutions in New York City	4,356	Estimated, based on last Wednesday of month reports
13 Deposits due to foreign official institutions at F R Banks	568	Daily data reported by F R Banks
14 Equals Demand deposits component of $M_1$	222,224	
15 Money stock ( $M_1$ ) — currency plus demand deposits adjusted	291,270	

<sup>1</sup> Gross demand deposits less demand deposits due to the U S Govt, interbank deposits, and CIPC See text for explanation

this report do not match the deposit definitions that are needed for the money stock. Consequently, a number of adjustments must be made to the basic data reported by member banks.

$M_1$  does not include demand deposits due to the U S Government nor demand deposits due to domestic commercial banks. These items must, therefore, be deducted from gross demand deposits reported on the reserve requirements reports as a first step in determining the demand deposit component of the money stock. This causes no problem since deposits "due to the U S Government" and "due to all commercial banks" are shown as separate categories on the report of deposits.

To avoid double counting of demand deposits that are simultaneously shown on the books of two banks at the same time, CIPC's are also deducted from gross demand deposits to derive the demand deposit component of  $M_1$ . CIPC's are allowed as a deduction item in the computation of deposits subject to reserve requirements and are therefore available on a daily basis from the report of deposits. CIPC's shown on this report, how-

ever, are not broken down by those cash items associated with private demand deposits and those cash items associated with all other operations of the bank, only a gross cash item figure is available.

From past investigations it is known that gross CIPC's overstate those items that should properly be deducted from money stock deposits. For example, cash items associated with interbank deposits, with U S Government deposits, with redeemed coupons of U S Government securities, and with bank credit cards are included in the gross cash items data. It is believed, based in part on past investigation and in part on contacts with bank accountants, that the size of the distortions noted above are not large, and further that these distortions remain a fairly constant proportion of total deposits. Therefore, while the level of the money stock may be distorted slightly, money stock growth rates are probably not affected in a significant way because of the overstatement of cash items from these sources.<sup>5</sup>

<sup>5</sup>This note appears on opposite page

The subtotal derived from these first subtractions for member banks, as shown in Table 3, is defined as gross demand deposits less demand deposits due to the US Government and all commercial banks less CIPC's. That item is not the demand deposit component of the money stock, however, since still other adjustments are necessary to obtain statistical estimates of demand deposits as a component of  $M_1$ .

Federal Reserve float is very similar to CIPC's and is also deducted from private demand deposits adjusted to move toward the demand deposits component of  $M_1$ . FR float is deducted because on some items cleared through Federal Reserve Banks, credit is passed to the sending bank before the paying bank has received the item and reduced deposits. When the sending bank receives credit, the CIPC's are reduced on that bank's books even though deposit liabilities on the books of the paying bank have not been reduced. The amount of this double counting is reflected in the float created by Federal Reserve Banks. Therefore, a deduction for float is made to offset this double-counting effect.

Daily float data can be derived from the daily reports of condition submitted to the Board by each Federal Reserve Bank. While float can fluctuate widely from day to day, it is a relatively small component of  $M_1$  and averaged about \$2.7 billion in December 1974.

### *Nonmember bank demand deposits*

The second largest deposit component of the domestic money stock is the domestic non-

<sup>5</sup>A much more serious problem, and one that will be discussed in more detail later, concerns a significant portion of the CIPC's related to interbank transfer of funds associated in large part with the clearing of Euro dollar transactions in the New York City money market. These cash items should not be deducted from money stock deposits, because the deposits to which they apply are not part of  $M_1$ . Therefore, since they are included in total cash items, an estimate of their amount is added back through a special adjustment, item 8.

member bank component, "demand deposits at nonmember banks" in Table 3. Data for nonmember banks are available four times a year from call reports. In order to estimate the deposits of nonmember banks for other periods, the ratio of the nonmember bank demand deposit component of  $M_1$  to that of the smaller member banks' demand deposit component of  $M_1$  is computed on each call report date. A straight-line interpolation of this ratio, adjusted for bank structure changes,<sup>6</sup> is made between call report dates. The weekly ratios so derived are then applied to weekly-average deposits data reported by smaller member banks, in order to obtain weekly and monthly average estimates of the demand deposit component of the money stock at nonmember banks. (Monthly average estimates are derived by prorating the weekly estimates.) Beyond the period of the most recent call report, ratios are estimated based on a regression equation and judgment. As new call report data become available, these nonmember bank estimates are revised and "benchmarked" to the universe data available from the call report.

### *Further adjustments*

A significant part of gross CIPC's (deducted to obtain demand deposits at member banks in Table 3) is related to the transfer of interbank funds related to Euro-dollar transactions in the New York money market and should not be deducted from the deposits properly included in  $M_1$ . These interbank fund transfers create interbank demand deposits, deposits not included in the money stock measure. Since cash items generated from the transfer of Euro-dollar funds are not associated with money stock deposits, their deduction from money stock deposits would cause an understatement of the level of the  $M_1$  series. And, if these cash items were

<sup>6</sup>Banking structure changes reflect shifts in membership status, mergers, liquidations, and the like.

growing rapidly relative to total deposits (as they apparently have in recent years) the growth rate of the series would also be distorted

In order to adjust for the CIPC's associated with interbank transactions in New York City, data reflecting the volume of these transfers are collected from Edge Act corporations, agencies and branches of foreign banks operating in the United States, and other foreign-related institutions in New York City. These data are used as a proxy measure for the amount of cash items that are recorded on the books of member banks and improperly deducted from member bank demand deposits. The deduction is improper because these cash items have no corresponding money stock liability on the books of the reporting banks. These data are available on a daily basis and are reported to the Federal Reserve Bank of New York. In December 1974, as shown in Table 3, this adjustment amounted to more than \$3.5 billion.

The money stock as currently defined does not include demand deposits due to domestic commercial banks but does include demand deposits due to foreign commercial banks, mutual savings banks, and banks in U.S. territories and possessions. In order to obtain items 5 and 7 (demand deposits at member and nonmember banks), demand deposits due to banks were subtracted from gross demand deposits. Deposits due to banks as reported on the report of deposits, however, include not only deposits due to domestic commercial banks—which must be subtracted from gross demand deposits to get the demand deposit component of the money stock—but also deposits due to mutual savings banks, foreign commercial banks, and banks in territories and possessions.<sup>7</sup> But the last three items, since they are defined as part of the money stock,

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<sup>7</sup>It should be noted that deposit liabilities of banks in U.S. territories and possessions are *not* part of the money stock. It is deposit liabilities of banks in the United States to banks in U.S. territories and possessions that are part of the money stock.

should not be deducted from gross demand deposits. Thus, estimates of the deposits due to these institutions must be derived from other data sources and added back to demand deposits in order to obtain the demand deposits adjusted component of  $M_1$ .

The bulk of deposits due to foreign commercial banks and to mutual savings banks is held at weekly reporting banks. These banks report full balance sheets each Wednesday—including deposits due to foreign commercial banks and mutual savings banks. These single-day data are used as a proxy measure for the weekly-average level of such deposits at the weekly reporting banks. Monthly-average estimates are based on proportions of the weekly-average estimates. Estimates of deposits due to foreign commercial banks and to mutual savings banks at non-weekly reporting banks are derived from call report data. Between call report dates these deposits are estimated on the basis of a straight-line interpolation. Estimates of these deposits for December 1974 are shown in Table 3.

Demand deposits due to banks in territories and possessions must be estimated differently. In order to estimate this component, it is necessary to make a special tabulation of the call report showing balance-sheet data for banks located outside the United States, sometimes referred to as "other areas." Included in this tabulation is an item on the asset side "demand deposits *due from* U.S. banks." This item is assumed to be equivalent to the demand deposits *due to* banks in territories and possessions that are included in demand deposits due to banks on the books of U.S. commercial banks; it is used as a proxy measure for that item. As shown in Table 3, the amount of such deposits is small.

In addition to demand deposits at domestic commercial banks,  $M_1$ -type deposits at Edge Act corporations, agencies and branches of foreign commercial banks, and other foreign-related institutions are included in the money stock. For reserve requirement purposes, Edge Act corporations must file a report of deposits

on a weekly basis, as member banks do. These weekly reports, showing daily data, are the source of the Edge Act component of  $M_1$ . From 1972 through early 1975, estimates of  $M_1$  deposits at agencies and branches of foreign banks and other foreign-related institutions were based on last-Wednesday-of-the-month reports filed by these institutions. Since April 1975, daily deposit data have been collected from each of these institutions by the New York Federal Reserve Bank.<sup>8</sup>

The final component of the money stock is demand deposits of foreign central banks and other official institutions at Federal Reserve Banks. This amount is shown daily on the Federal Reserve Banks' daily statements of condition. The amount is usually relatively small (about \$500 million in December 1974).

### Very short-run (transitory) variations in the monetary aggregates

Apart from seasonal and longer-term movements, the monetary aggregates are subject to substantial short-run (transitory) variations for two main reasons. First, preliminary series often exhibit variations that are smoothed as more complete data become available from different financial institutions that report at different intervals, and as reporting errors are corrected. Second, unsystematic variations occur—from day to day and over slightly longer periods—in payments among the public, the Treasury, and banks, and other transitory variations are caused by reporting errors and delays of items in transit.

These transitory variations tend to average out over the longer run, but they often produce consequential variations in the weekly, monthly, and even quarterly data. It is possible to estimate statistically the size of such

<sup>8</sup>Prior to 1972,  $M_1$  deposits at these foreign-related institutions were estimated on the basis of call reports and monthly reports filed with the New York State Banking Department. In some cases back data were not readily available, and estimates had to be made based on end-of-year call report data and other information that could be gathered by the staff of the Federal Reserve.

variations. We recommend that the Fed regularly publish the range of revisions in data and uncorrected transitory variations—to warn users of the published aggregates against unnecessarily confusing the systematic part of observed changes in the monetary aggregates with transitory short-run variations. Published money stock data that may appear to represent large changes in growth rates often in fact reflect only transitory changes.

### Revisions of preliminary estimates of the money stock

Data on the money stock are compiled from reports of banks and other financial institutions that become available with varying delays. A preliminary estimate for each month is published about 10 days after the end of the month. As additional reports are received, new estimates are substituted for the initial estimates, and a revised  $M_1$  figure is published about 3 weeks after the end of each month. This figure is subject to additional revisions when call report data for nonmember banks become available, when the seasonal adjustment is revised, or when special corrections are made retrospectively (for example, that in 1970 to eliminate a cash item bias for previous years).

These successive revisions can be sizable. Table 4 summarizes the successive revisions in  $M_1$  since 1968, showing monthly, quarterly, and annual estimates. The differences shown for monthly estimates, for example, are for (1) the first revision (about 3 weeks after first publication) minus the initially published estimate made 20 days earlier, (2) the final estimate as of August 1975 (including benchmarking for nonmember bank data, latest seasonal adjustment, and other special corrections) compared with the first revision, (3) the final estimate compared with the initial estimate, and (4) the total revision due to changes in the seasonal adjustment only. The final estimates used here, particularly those for 1974 and 1975, may be revised still further for seasonal adjustment and special cor-

**TABLE 4 Differences in Estimates of Growth in  $M_1$  Between Initially Published, First, and Final Revisions, January 1968 to August 1975**

Annual rates of change in per cent

Difference between --	Mean	Standard deviation	Range ( $\pm$ ) within which 95 per cent of revisions in growth rates will fall <sup>1</sup>
<b>Successive monthly averages</b>			
1 First revision <i>minus</i> initial estimate	- 36	1 25	2 5
2 Final estimate <i>minus</i> first revision	80	2 90	5 8
3 Final estimate <i>minus</i> initial estimate	44	3 20	6 4
4 Line 3 due to seasonal adjustment <sup>2</sup>	01	2 13	4 2
<b>Monthly averages a quarter apart</b>			
1 First revision <i>minus</i> initial estimate	- 05	65	1 3
2 Final estimate <i>minus</i> first revision	74	1 54	3 1
3 Final estimate <i>minus</i> initial estimate	69	1 73	3 5
4 Line 3 due to seasonal adjustment <sup>2</sup>	01	1 26	2 5
<b>Monthly averages a year apart</b>			
1 First revision <i>minus</i> initial estimate	02	34	7
2 Final estimate <i>minus</i> first revision	61	69	1 4
3 Final estimate <i>minus</i> initial estimate	64	77	1 5
4 Line 3 due to seasonal adjustment <sup>2</sup>	01	12	2

<sup>1</sup> Assumes differences are normally distributed around the mean

<sup>2</sup> Estimated from the implied seasonal factors for the total money stock used at the time of the initial publication and in August 1975, as applied to the final estimate of the unadjusted stock

rections, so the differences on the second, third, and fourth lines may not be entirely accurate. The differences shown for the period as a whole, however, are reasonably indicative of the magnitude of successive revisions.

The comparable differences for quarterly and annual data are smaller than for monthly data because most of the revisions pertain to only the later month and not the base month of the changes shown. The mean differences throughout do not equal zero, as would revisions for unbiased errors in estimating unavailable items, because the benchmark revisions and the special corrections have tended upward over this period. As is apparent from the standard deviations, both first and final revisions have been substantial, primarily because of revisions of the seasonal adjustments and of benchmarking when late data for nonmember banks become available.

### *Unsystematic day-to-day variations*

The monetary aggregates exhibit systematic movements attributable to intraweekly and seasonal fluctuations plus the more basic movements introduced by Federal Reserve policy. After allowances are made for the systematic movements, unsystematic (transitory) variations remain in the data. To assess

the importance of these unsystematic variations, the Committee requested the Board's staff to make estimates based on a simple analysis of variance. The staff also explored more sophisticated methods of estimation noted later, which do not require the same assumptions as the analysis of variance.

In the initial analysis of variance estimates it was assumed that systematic intraweekly variations are the same for all weeks in a year (this is equivalent to no interaction between days and weeks) and that unsystematic day-to-day variations are not serially correlated. The analysis begins by taking the difference between the money stock each day and the average level for the week. The average of these differences over the year for Mondays, Tuesdays, and so on gives the average intraweekly variation. Then these average differences are subtracted from the corresponding difference for each day of the year. The subtraction gives the daily residuals from the average intraweekly variation and the week's average. The standard deviation of these residuals is an estimate of the day-to-day variation in the money stock.

The standard deviations of the residuals for demand deposits, currency, time deposits, and two aggregates are shown in Table 5 for the separate years 1968-74 and for the full



**TABLE 5 Standard Deviation of Day-to-Day Variation in Monetary Time Series**  
Percentage of series level

Period	Demand deposits	Currency	M <sub>1</sub>	Time deposits	M <sub>2</sub>
1968	637	495	503	103	253
1969	776	506	615	077	317
1970	747	481	585	105	314
1971	658	518	522	096	235
1972	651	551	509	088	213
1973	708	566	564	125	233
1974	755	566	595	106	225
1968-74	711	527	561	111	261

**TABLE 6 Analysis of Variance of Log<sub>e</sub> M<sub>1</sub>, 1968-74**  
In thousands of dollars

Source of variation	d f 1	Sum of squares	Mean square	F ratio
Weeks	363	28 07335	07734	2460 295
Days of week	4	01078	00270	85 76026
Residual	1,452	04564	00003143	
Total	1,819	28 12978	01546	
Multiplicative day effect				
Thursday		99993		
Friday		99615		
Monday		1 00334		
Tuesday		1 00161		
Wednesday		99899		

<sup>1</sup> Degrees of freedom

<sup>2</sup> Standard deviation of residual in per cent is

$$\sqrt{00003143 \times 100} = 561$$

period The original data were converted to natural logarithms in order to express the standard deviation as a percentage of the level of the monetary data The analysis of variance on which Table 5 is based is illustrated for the 1968-74 figure for M<sub>1</sub> in Table 6

From these standard deviations we can calculate the variation in money growth rates due to the day-to-day variation On the assumption of no serial correlation, the variance of the residual variation in a 5-day weekly average would be one-fifth of that in 1-day figures But the weekly average as currently calculated is a 7-day average with the Friday figure counted three times For this 7-day average the variance is

$$\frac{1 + 1 + 1 + 1 + 3^2}{7^2} \sigma^2 = \frac{13}{49} \sigma^2$$

where  $\sigma$  is the standard deviation of the daily residuals

For a month (assumed for simplicity to be exactly 4 weeks) the variance is one-fourth as large Thus the formula for the standard

deviation (square root of the variance) for the monthly growth rate is

$$\sqrt{2 \left(\frac{1}{4}\right) \frac{13}{49}} \sigma = 364\sigma$$

(and then multiplied by 12 to express in terms of annual rates) and for the rate between successive quarterly averages (13 weeks in each quarter) is

$$\sqrt{2 \left(\frac{1}{13}\right) \frac{13}{49}} \sigma = 202\sigma$$

(and then multiplied by 4 to express in terms of annual rates)

These and similar formulas were used to derive the implied transitory variations in growth rates in Table 7 On the average, roughly 95 per cent of all growth rates as measured will be within two standard deviations above or below the systematic component For M<sub>1</sub> this range is  $\pm 5$  percentage points for month-to-month growth expressed as an annual rate,  $\pm 1$  percentage point for growth between successive quarterly averages expressed as an annual rate, and  $\pm 0.1$  percentage point for year-to-year growth These ranges are about one-half as large for M<sub>2</sub>

Given the usual magnitude of money growth rates of about 3 to 8 per cent per year, only the quarterly and yearly rates are reasonably indicative of systematic movements in the aggregates The quarterly and yearly rates have a

**TABLE 7 Variation in Monetary Growth Rates Due to Transitory Fluctuations<sup>1</sup>**  
Annual percentage rate

Designated growth rates	Standard deviation	Range ( $\pm$ ) within which 95 per cent of growth rates will fall
Successive monthly averages		
M <sub>1</sub>	2.45	4.9
M <sub>2</sub>	1.14	2.3
Successive quarterly averages		
M <sub>1</sub>	.45	.9
M <sub>2</sub>	.21	.4
Successive annual averages		
M <sub>1</sub>	.06	.12
M <sub>2</sub>	.03	.06
Monthly averages		
A quarter apart -		
M <sub>1</sub>	.82	1.6
M <sub>2</sub>	.38	.8
A year apart -		
M <sub>1</sub>	.20	.4
M <sub>2</sub>	.10	.2

<sup>1</sup>  $\sigma$  for M<sub>1</sub> is .561 and for M<sub>2</sub> is .261

smaller range of variation, in part because the rates for the longer period average out more of the day-to-day variation and in part because there is less blow-up in annualizing these growth rates

These ranges of variation are estimated to be somewhat smaller when the serial correlation still remaining in the daily residuals of the analysis of variance is removed. This serial correlation reflects systematic short-run variations that last longer than a day but less than a week and systematic variations due to holidays and other particular days of significance in the payments and clearing process. Estimates made by the Board's staff of these influences on the money stock account for one-fourth of the variations shown in Tables 5 and 6. Consequently, the range of variations shown in Table 7 would, according to these estimates of the residual variations, be reduced by a quarter. The danger exists, however, that these more sophisticated methods of estimating the residual variation may overstate the systematic component of movements in the aggregates.

While we recommend that estimates of the range of transitory variation in the various money growth rates be published regularly, we are not prepared to recommend one specific method of estimation as necessarily best among the reasonable alternatives available.

### *Averaging of daily data*

Weekly money stock data are now calculated as an average of 7 days. Since most banks are closed on Saturday and Sunday, they report the preceding Friday figure for Saturday and Sunday. The Friday figure receives a weight of 3/7 and each of the other 4 days of the week a weight of 1/7. The Committee discussed the advisability of an alternative weekly average based on 5 days, in which each day Monday through Friday would receive a weight of 1/5—on the ground that this might reduce transitory variability in the monetary aggregates and bring them into closer correspondence with the public's spending decisions.

The day-to-day variability is larger in the

7-day average. As shown above, the standard deviation of this variability is  $\sqrt{\frac{13}{49}}$  of the standard deviation of the day-to-day variation, while in the 5-day average it is  $\sqrt{\frac{1}{5}}$ . Hence a 5-day weekly average instead of a 7-day average would reduce this variability by a small amount.

$$\left(\sqrt{\frac{13}{49}} - \sqrt{\frac{1}{5}}\right) \sigma = 0.68\sigma$$

There would be a corresponding reduction of such variability in the growth rates. The reduction is slight, but the necessary computational cost is also small.

Although it would be desirable to reduce this source of variability, the choice between 7-day and 5-day weekly averages also depends upon the appropriate treatment of the systematic component in the data. A 7-day average appears appropriate if the public takes its Saturday and Sunday holdings of  $M_1$  into account in deciding whether to purchase goods and services or to acquire other financial assets. In view of the fact that deposits cannot actually be transferred on Saturdays and Sundays (except that many banks are now open on Saturdays for making deposits and withdrawals), it might appear that the weekend amounts are not a part of transactions balances (that is, Friday balances count once) and so do not affect spending. Yet they may affect the holder's assessment of the average amount of his money balances over a week or a month and in that way influence his spending decisions.

The Committee did not find that a clear case could be established, or that the potential benefits would be sufficiently large, to justify changing the standard practice of averaging the monetary aggregates from a period of 7 days to a 5-day period.

### **Nonmember bank deposits**

The estimation of demand deposits adjusted for commercial banks that are not members of the Federal Reserve System has been a particularly significant source of error and uncertainty in current statistics of  $M_1$ . While nonmember

deposits account for only about one-fifth of the money stock, large revisions of early estimates of  $M_1$  have repeatedly been required because of revisions in the nonmember bank deposit series. Even after revision, the historical estimates for nonmember banks are much less reliable than those for member banks, except for two to four call report days each year.

The problem arises because reporting by nonmember banks is so infrequent, the universe reports on deposits are for only 2 days each year—call reports at the end of June and December—although FDIC-insured banks also report on one day in spring and one in autumn. Moreover, about 4 months elapse between the date of each call report and the availability of processed information from the report that can be incorporated into money stock estimates.

Using historical information on nonmember bank deposits for those infrequent reporting dates, the Federal Reserve staff has found that the ratio of such deposits to those of smaller (country) member banks can be approximated roughly by a regression relationship that uses, as explanatory variables, linear and quadratic time trends and the 90-day Treasury bill rate (the significance of the latter being that nonmember banks are not affected in the same way as country member banks by changing credit market conditions). When any weekly or monthly estimate of  $M_1$  is initially made—say, monthly for July—the nonmember bank demand deposit component is simply extrapolated from the latest available reported nonmember bank data, which at that time would be for the last day of December, using that regression estimate (with a judgmental adjustment) and the known total for country member banks in July.

Experience has demonstrated that these extrapolations often produce substantial errors, in recent years they have averaged more than \$1 billion. When the actual data for insured nonmember banks for the next call report date—which, in the example, would be during the spring—become available about August, a benchmark revision is made. Some

of the recent revisions in  $M_1$  required by the call report data have been especially large, including ones of \$1.7 billion (upward) for mid-1973, \$1.2 billion (downward) for mid-1974, and \$2.4 billion (downward) for spring 1975. Moreover, use of the current—or any alternative—extrapolation procedure might become subject to even greater errors in the event of more structural changes in the banking system.

Once the spring call report benchmark data are available, the level of nonmember bank deposits for the entire 8-month interval since the preceding report date in December must be interpolated to match a new estimated relationship of the ratio of nonmember bank demand deposits to country-member bank demand deposits using the spring call data. Moreover,  $M_1$  and related aggregates are estimated as weekly or monthly averages. Thus, because the “final” nonmember call report data cover only a single day, some assumption must be made as a basis for estimating the weekly average of nonmember bank demand deposits, even for the week of the call report. It is currently assumed that the ratio of the weekly average for that week to the known 1-day figure for nonmember banks is the same as it is for country member banks.

The same procedures and thus the same kinds of problems apply to the estimation of nonmember bank time deposits for inclusion in  $M_2$ . In practice, however, the size of benchmark revisions for time deposits has been significantly smaller, although far from trivial.

For a period from summer 1974 to spring 1975, the FDIC asked (although it did not require) a sample of 573 insured nonmember banks to report daily aggregates of selected balance sheet items, and it transmitted summary information from this sample to the Federal Reserve, although with a lag of at least 2 months. The sample was stratified by size, including (in principle) universal coverage of about 177 nonmember banks with total deposits in excess of \$100 million (large nonmember banks). Explorations with the sample data point to several revealing conclusions.

First, under present procedures the problem of inferring a weekly average from a 1-day

report is itself significant. Day-to-day variations in demand deposits are sizable. When the ratio of weekly-average deposits to call-report-day deposits for the sample (instead of the corresponding weekly-average to 1-day-deposit ratio of country member banks) is used to convert the 1-day figure for the universe of nonmember banks to a weekly average, the estimates differ by amounts between \$200 million and \$1 billion. There is every reason to believe that the estimate based on the sample is more reliable. These discrepancies produce permanent errors in the historical series on  $M_1$  as now constructed.

Second, demand deposits of small nonmember banks behave differently from those of large nonmember banks, hence, the sample data for the large nonmember banks cannot be used to improve significantly the estimates for the smaller nonmember banks.

Third, the pattern of *weekly changes* (as distinct from levels) in demand deposits for the sample is not drastically different from the pattern estimated for nonmembers by existing procedures on the basis of changes at country member banks.

Fourth, the statistical properties of the FDIC sample imply that, when the sample is used to extrapolate data from the latest call report date, it should provide initial estimates of the universe total of nonmember demand deposits with a standard error of a little more than \$300 million. When the sample is used to interpolate between data from the preceding and succeeding call report dates, the "final" estimate should be obtained with a standard error of at the most \$240 million.

Fifth, the sample improves accuracy to a major degree. The evidence from three call report dates is reasonably consistent with the *a priori* estimate of the standard error. If the data from the sample had been available on a current basis and if they had been incorporated into the initial estimates of  $M_1$ , the benchmark revisions for the reporting dates in the fall and in December 1974 and in the spring of 1975 would have been no more than \$200 million instead of ranging up to \$2.4 billion.

After reviewing current procedures, the sample explorations, and various alternative proposals, the Committee concluded that the inaccuracies in the estimate of demand deposits of nonmember banks represent a major defect in up-to-date monetary statistics and a significant defect in historical statistics of  $M_1$  and that marked improvements are feasible at reasonable costs for both reporting nonmember banks and the Federal agencies involved.

Encouraged by the results obtained from the daily reporting sample of nonmember banks, the Committee urges the resumption of such a procedure on a continuing basis and the development of techniques to permit the sample reports to be processed as rapidly as are data from country member banks. The Committee has considered carefully the possibilities of improving provisional estimates and interpolations of nonmember bank deposits by new methods that rely on currently available data from member banks. We recognize that such methods would be less costly, but in our judgment they would be far less reliable. We are convinced that a currently reporting sample of nonmember banks is essential to develop up-to-date estimates for the nonmember universe with a reasonable standard of accuracy—which, in our judgment, would be met by a standard error of around \$300 million.

The Committee also recommends that all nonmember banks be asked to report weekly data in addition to 1-day figures on call report dates, and that the processing period for the call report data be shortened substantially from its current 4-month length. It is our understanding that this change would not be costly to either the reporting banks or the Federal data processors.

In combination, these two reforms would, for practical purposes, substantially solve the currently significant problem of inaccurate estimates of nonmember bank deposits in the monetary aggregates.<sup>9</sup>

<sup>9</sup>As this report is being completed, we are informed that beginning in March 1976, the FDIC plans to collect 7 days of deposit data for each call report week. We

### Consolidation of data from different financial institutions

Conceptual issues in defining monetary aggregates discussed above point to special problems of measurement in avoiding double counting. The Committee paid special attention to the problems that arise in the treatment of bank float.

#### *Present treatment of float*

The elapsed time between sending, depositing, and collecting checks gives rise to changes in bank deposits that are referred to as float. As we noted earlier, there are two kinds of float—mail float and bank float. When *A* writes a check, he records a debit to his check-book balance. Until *B* receives the check and deposits it in his bank, deposits on the books of the banks have not been affected. During this period the check is in transit between *A* and *B*, and the dollar amount of such checks is called “mail float.” When *B* receives and deposits the check, his deposit balance is increased, and his bank sends the check for collection to *A*’s bank, recording a CIPC as an asset on its books. When the check clears, *A*’s deposit account is debited, and reserves are transferred from *A*’s bank to *B*’s. In the interim between *B*’s deposit of this check and its debit to *A*’s account, *B*’s deposits are higher and *A*’s have not yet been reduced, thus total recorded deposits in the banking system are higher by the amount of the CIPC. This increase in recorded deposits, or double counting, due to checks in process of collection between banks is called bank float.

As noted previously, we have accepted the traditional procedure of deducting bank float but not mail float, for the reasons indicated. If all banks kept their records properly, bank

float would be measured by the CIPC between banks.

#### *Current errors in the treatment of bank float*

The process of eliminating double counting of deposits by deducting bank float can lead to error when checks are drawn on accounts that are not included in the money stock or when checks in process of collection are not reported as CIPC.

The first error arises from checks drawn on U.S. Government, interbank, and foreign accounts, as well as collections of nondeposit items, comprising mainly postal money orders and nonbank traveler’s checks, redeemed savings bonds and coupons on Government securities, food stamps, and credit-card slips. Inclusion of these items in the CIPC produces an overly large subtraction from gross deposits and hence an understatement of domestic demand deposits held by the public. It would be very costly for banks to count these items separately, and no attempt is made to do so in calculating  $M_1$ .

The second error arises from the practice of many banks of clearing checks through correspondents and of reporting checks in process of collection as “due from banks” rather than as CIPC. Suppose, for example, a check drawn on Bank B is deposited in Bank A and collected through correspondent Bank C. Instead of crediting “due from banks,” Bank A should credit CIPC until the next day when its account at Bank C is credited, but it has no incentive to do this. Indeed, some nonmember banks have a special incentive not to do so. (Whereas for member banks, both due from banks and CIPC are deducted from gross deposits in calculating reserve requirements, for some nonmember banks the amount due from banks, but not CIPC, is counted as part of the bank’s legal reserves.) In addition, Bank A relieves itself of the bookkeeping cost of transferring items from CIPC to due from banks by shortcutting the CIPC stage of accounting. Once Bank C receives the check and credits its CIPC, the

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note that the FDIC staff is convinced, reviewing the same evidence we have used, that availability of this improved regular call report data plus information provided by the experimental sample will make it possible to meet our standards of accuracy without institution of a regularly reporting sample of nonmember banks. We doubt that this is possible.

money stock adjusted for CIPC is again the same as it was before the check was deposited in Bank A. On the first day, however, the calculated money stock adjusted for CIPC is higher than it should be because Bank A does not record a CIPC.

Prior to November 9, 1972, there was another source of error that was opposite to the due-from-banks bias just noted—the Federal Reserve gave Bank B 1 day to remit payment. This pertained to all checks that cleared through the Federal Reserve payments system. In that 1-day grace period, Bank B debited the payer's deposits and credited, not its CIPC, but a nondeposit liability to the Federal Reserve (which reduced Bank B's reserve requirements). On this day total deposits were as they had been before the check was deposited in Bank A, but Bank C still carried a CIPC. Hence the money stock was measured as being lower than it should have been. Since it was too high the first day and too low the third day, on the average during the full transaction it was correct.

A change in Regulation J on November 9, 1972, required banks to remit payment to Federal Reserve Banks on the same day.<sup>10</sup> This produced the present clearing process and thus removed the offset to the due-from-banks bias on the first day described above.

As the check-clearing process speeds up in the future, the overstatement of the money stock because of due-from-banks bias will disappear since all the transactions in the three-bank clearing process will be completed on the same day. However, the attainment of same-day clearing is some years away.

In addition to the change in Regulation J, two other steps have been taken in recent years to correct major errors in the measurement of bank float. First, effective July 31, 1969, Regulation D was changed to require member banks to include in their deposits subject to reserve requirements any checks sent by them in pay-

<sup>10</sup>"Revision of the Money Stock Measures and Member Bank Reserves and Deposits" Federal Reserve *Bulletin*, February 1973, pp 62-64

ment of foreign Euro-dollar transactions. Such deposits serve as an offset to the increase in CIPC that is produced when the receiving banks remit the checks for payment.<sup>11</sup> Second, a similar kind of bias originated in the checks sent by agencies of foreign banks and Edge Act corporations. Prior to 1970, deposits with these institutions were not included in the money stock, so subtraction of float generated by checks drawn on these deposits improperly reduced the calculated money stock. This understatement was corrected in 1970 by incorporating into  $M_1$  the deposits and officers' checks reported by these institutions.<sup>12</sup>

### *Tentatively recommended alternative calculation of $M_1$*

We tentatively recommend an alternative method of eliminating bank float in calculating  $M_1$ , which we believe will produce significantly improved estimates of  $M_1$  and related aggregates. To remove the due-from-banks bias resulting from inadequate use of CIPC, we recommend that amounts due to banks be included in gross deposits and then those due from banks be subtracted. In this way, *net* domestic commercial interbank deposits would be eliminated from the gross deposits on banks' books. Using this net figure ex-

<sup>11</sup>"Revision of Money Supply Series," Federal Reserve *Bulletin*, October 1969, pp 788-89

<sup>12</sup>"Revision of the Money Stock," Federal Reserve *Bulletin*, December 1970, pp 890-92

In further investigations of CIPC problems for this Committee, the Board staff discovered that the cash-items bias adjustment has been overstated in some cases. One source of overstatement is that some banks have been accounting for checks deposited by agencies of foreign banks and Edge Act corporations in a different manner. In these banks these checks are not credited to the accounts of the receiving institutions on the day of deposit and therefore do not produce a CIPC that day, as is assumed by the bias adjustment, rather they are credited on the next day, when the officers' checks drawn against these deposits clear. A second source of overstatement is that the checks deposited by these institutions in New York City banks for collection do not give rise to CIPC if, as is true to some extent, the checks are drawn on the same bank in which they are deposited. The Board's staff has undertaken to correct this overstatement of the cash items bias adjustment in the published data.

cludes from  $M_1$  any CIPC inappropriately reported by banks as due from banks

Under this recommendation  $M_1$  would thus be calculated by deducting amounts due from domestic commercial banks and CIPC from gross deposits exclusive of Treasury deposits but inclusive of amounts due to US banks (As recommended earlier, amounts due to foreign commercial and central banks would also be excluded) The recommendation has the further advantage of making data collection easier than it is now, because the separate estimates now required of deposits of mutual savings banks and banks in territories and possessions would no longer be necessary (Such deposits would be included in the due-to-banks item of the recommended definition) The reasons why we propose this recommendation only tentatively are explained in the following discussion

Table 3 illustrates in detail how  $M_1$  is currently estimated Table 8 repeats that calculation in the first column and shows in the second column how  $M_1$  would be estimated for December 1974 by using the tentatively recommended alternative approach The more

simple method recommended should eliminate the CIPC bias that has troubled the existing method, and should avoid the necessity of making the difficult estimates shown in lines 7-10 under the present method On the other hand, the alternative method requires special data on Edge Act corporations and their CIPC's that are not required under the present method, but the sums involved are relatively small

As Table 8 indicates,  $M_1$  calculated by the tentatively recommended alternative is \$8 billion less than when estimated by the currently used method In principle, the current and the tentatively recommended alternative methods should give identical figures for  $M_1$  Thus, the choice is not one of concept, but rather a statistical issue as to which method makes possible the closest approximation to the concept involved Detailed staff analysis suggests that the precise reasons for the discrepancy are centered in the recording of foreign transactions, mainly at large New York City banks, and that they have developed mainly over the years since 1970, although there was a significant difference in the late 1960's

**TABLE 8 Comparison of Methods<sup>1</sup> for Calculation of Demand Deposit Component of  $M_1$**   
Monthly average, millions of dollars

Line, item	December 1974	
	Current	Recommended
1 Gross demand deposits at commercial banks	291,789	291,789
<i>Less</i>		
2 Demand deposits due to commercial banks	34,792	
3 U S Govt demand deposits	4,875	4,875
4 CIPC	42,853	42,853
5 F R float	2,732	2,732
6 Demand deposits due from domestic commercial banks		30,482
<i>Plus</i>		
7 CIPC adjustment	3,519	
8 Demand deposits due to foreign banks	6,004	
9 Demand deposits due to mutual savings banks	1,124	
10 Demand deposits due to banks in territories and possessions	116	
11 <i>Equals</i> Commercial banks' component of $M_1$	217,300	210,847
<i>Plus foreign related institutions</i>		
12 $M_1$ type balances at Edge Act corporations, agencies, and investment companies <sup>2</sup>	4,356	
13 Foreign demand deposits at F R Banks	568	568
14 Gross demand deposits of Edge Act corporations, agencies and investment companies <sup>2</sup>		8,619
<i>Less</i>		
15 CIPC at Edge Act corporations, agencies, and investment companies <sup>2</sup>		1,169
16 Demand deposits due from banks at Edge Act corporations and agencies		4,615
17 <i>Equals</i> Total demand deposits	222,224	214,250
18 <i>Plus</i> Currency	69,046	69,046
19 <i>Equals</i> Total $M_1$	291,270	283,296
20 <b>Difference</b> Recommended less current		-7,974

<sup>1</sup> For an explanation of the method currently used, see Table 3 and the accompanying text

<sup>2</sup> Branches included in 1974 data

**TABLE 9 Alternative Estimates of  $M_1$ , 1968-74**  
**Averages of daily figures for December**  
**In billions of dollars**

Line, item	1968	1969	1970	1971	1972	1973	1974
1 Current $M_1$	208 1	214 8	225 7	240 4	262 6	278 6	291 3
2 Plus Net interbank deposits	6	1 2	7	2	-2 0	-4 2	-4 5
3 Minus Adjustment for cash items bias	1 8	2 6	4 7	3 7	2 9	2 4	3 5
4 Minus Adjustment for overstatement of remittance payments bias	1 3	1 4	1 5	1 6			
5 Equals Recommended $M_1$	205 6	212 0	220 2	235 3	257 7	272 0	283 3
6 Difference (5) minus (1)	-2 5	-2 8	-5 5	-5 1	-4 9	-6 6	-8 0

Table 9 shows annually for the period 1968-74 the major items involved in estimating  $M_1$  by the tentatively recommended alternative, in comparison with  $M_1$  as currently estimated.  $M_1$  under the alternative method (line 5) is derived from the current  $M_1$  by adding net interbank deposits and subtracting two adjustments. The first, shown on line 3, removes the current cash-items-bias adjustment because the inclusion of amounts due to banks provides an offset to the Euro-dollar transfers and other checks that may now be improperly included in the CIPC. The second, shown on line 4, adjusts for the fact that the remittance-bias correction in the money stock, made for the period before the change in Regulation J in November 1972, is too large for the recommended definition.

Prior to November 1972 the 1-day grace period for remitting payment to Federal Reserve Banks created a CIPC bias because the remitting bank debited the deposit account on which the check was drawn and at the same time credited, not a CIPC, but a nondeposit liability to the Federal Reserve. This resulted in an understatement of CIPC. However, some nonmember banks, which remitted through correspondents, debited their due-from-banks account on the day before their correspondent simultaneously remitted to the Federal Reserve and debited the due-to-banks account, which offset the understatement of CIPC. Because of this offset, adjustment of CIPC for the remittance bias is too large for the recommended alternative method that deducts due-from-banks deposits directly. The Board's staff has estimated the amount of this remittance bias prior to November 1972 that is not applicable to the recommended definition. These estimates, on line 4 of Table 9, are subtracted

from the current  $M_1$  to obtain the alternative estimate of  $M_1$ .

Line 6 shows that  $M_1$  estimated by the alternative method is persistently smaller than  $M_1$  as now estimated. The difference before 1970, which is in the \$2.5 billion to \$3 billion range, appears to reflect largely the exclusion of checks in transit that were inappropriately reported as due from banks, exclusion of these cash items as proposed should remove this significant source of spurious variation in the money stock.

Beginning in 1970, however, the difference between the current and alternative methods becomes much larger for reasons that have not yet been fully determined. In 1972 agencies of foreign banks and Edge Act corporations instituted the Paper Exchange Payments System (PEPS) to facilitate the clearing of Euro-dollar transactions, and it seems likely that this system accounts for most or all of the recent increase in the line 6 difference, since data for banks outside New York City do not exhibit a comparable increase. In addition, the institution of the New York Clearing House Interbank Payments System (CHIPS) in 1970 may account for some of the sharp increase in the difference in 1970-71.

$M_1$  series as estimated by the current and alternative methods are compared on monthly and quarterly bases in Tables 10 and 11. Both were seasonally adjusted by the same Census Bureau X-11 program without any judgmental adjustments. These tables were constructed in early 1975 and so do not include recent revisions in the data. The comparison should thus be considered tentative pending incorporation of these revised data.

The differences between the two  $M_1$  series



TABLE 10 Comparison of Current and Recommended  $M_1$ —Monthly

Seasonally adjusted, amounts in millions of dollars

Date	Demand deposits in —		Currency	Current $M_1$	Recommended $M_1$	Column 5 minus column 4	Annual growth rates (in per cent)		
	Current $M_1$	Recommended $M_1$					Current	Recommended	Column 8 minus column 7
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1968—Jan	147,708	147,787	40,699	188,407	188,486	79			
Feb	148,171	148,303	40,809	188,980	189,112	132	3 65	3 99	34
Mar	148,493	148,651	41,081	189,574	189,732	158	3 77	3 93	16
Apr	148,996	149,112	41,273	190,269	190,385	116	4 40	4 13	— 27
May	150,271	150,032	41,427	191,698	191,459	—239	9 01	6 77	—2 24
June	151,494	151,334	41,770	193,264	193,104	—160	9 80	10 31	51
July	152,372	152,680	41,975	194,347	194,655	308	6 72	9 64	2 91
Aug	153,719	153,520	42,276	195,995	195,796	—199	10 18	7 03	—3 14
Sept	154,694	154,489	42,705	197,399	197,194	—205	8 60	8 57	— 03
Oct	155,893	155,897	42,843	198,736	198,740	4	8 13	9 41	1 28
Nov	157,535	157,308	43,284	200,819	200,592	—227	12 58	11 18	—1 40
Dec	158,936	158,376	43,528	202,464	201,904	—560	9 83	7 85	—1 98
1969—Jan	159,789	159,057	43,653	203,442	202,710	—732	5 80	4 79	—1 01
Feb	160,248	159,521	43,916	204,164	203,437	—727	4 26	4 30	04
Mar	160,675	159,723	44,102	204,777	203,825	—952	3 60	2 29	—1 31
Apr	161,184	160,252	44,090	205,274	204,342	—932	2 91	3 04	13
May	161,163	160,265	44,329	205,492	204,594	—898	1 27	1 48	21
June	161,607	160,702	44,632	206,239	205,334	—905	4 36	4 34	— 02
July	161,843	160,739	44,837	206,680	205,576	—1,104	2 57	1 41	—1 15
Aug	161,692	160,600	45,171	206,863	205,771	—1,092	1 06	1 14	08
Sept	162,328	161,423	45,323	207,651	206,746	—905	4 57	5 69	1 11
Oct	162,760	161,819	45,674	208,434	207,493	—941	4 52	4 34	— 19
Nov	163,058	162,308	46,036	209,094	208,344	—750	3 80	4 92	1 12
Dec	163,213	162,216	46,127	209,340	208,343	—997	1 41	— 01	—1 42
1970—Jan	164,971	163,090	46,304	211,275	209,394	—1,881	11 09	6 05	—5 04
Feb	163,606	161,525	46,491	210,097	208,016	—2,081	—6 69	—7 90	—1 21
Mar	165,047	162,633	46,728	211,775	209,361	—2,414	9 58	7 76	—1 83
Apr	166,160	163,928	46,898	213,058	210,826	—2,232	7 27	8 40	1 13
May	166,361	163,196	47,464	213,825	210,660	—3,165	4 32	— 94	—5 26
June	166,726	162,363	47,605	214,331	209,968	—4,363	2 84	—3 94	—6 78
July	167,035	163,391	47,901	214,936	211,292	—3,644	3 39	7 57	4 18
Aug	169,028	164,557	48,099	217,127	212,656	—4,471	12 23	7 75	—4 49
Sept	170,916	165,379	48,290	219,206	213,669	—5,537	11 49	5 72	—5 77
Oct	171,294	166,083	48,523	219,817	214,606	—5,211	3 34	5 26	— 92
Nov	171,916	166,117	48,789	220,705	214,906	—5,799	4 85	1 68	—3 17
Dec	172,630	167,333	49,060	221,690	216,393	—5,297	5 36	8 30	2 95
1971—Jan	173,653	168,513	49,453	223,106	217,966	—5,140	7 66	8 72	1 06
Feb	174,814	170,110	49,781	224,595	219,891	—4,704	8 01	10 60	2 59
Mar	176,320	171,550	49,969	226,289	221,519	—4,770	9 05	8 88	— 17
Apr	177,248	172,664	50,345	227,593	223,009	—4,584	6 92	8 07	—1 16
May	179,270	174,374	50,648	229,918	225,022	—4,896	12 26	10 83	—1 43
June	180,502	175,221	50,931	231,433	226,152	—5,281	7 91	6 03	—1 88
July	181,007	176,034	51,516	232,523	227,550	—4,973	5 65	7 42	1 77
Aug	181,956	176,696	51,725	233,681	228,421	—5,260	5 98	4 59	—1 38
Sept	182,359	177,295	51,994	234,353	229,289	—5,064	3 45	4 56	1 11
Oct	182,655	177,590	52,301	234,956	229,891	—5,065	3 09	3 15	06
Nov	182,703	178,370	52,384	235,087	230,754	—4,333	67	4 50	3 84
Dec	183,076	179,244	52,596	235,672	231,840	—3,832	2 99	5 65	2 66
1972—Jan	183,800	179,471	52,860	236,660	232,331	—4,329	5 03	2 54	—2 49
Feb	185,244	181,322	53,192	238,436	234,514	—3,922	9 01	11 28	2 27
Mar	187,129	183,760	53,546	240,675	237,306	—3,369	11 27	14 29	3 02
Apr	188,067	184,706	53,732	241,799	238,438	—3,361	5 60	5 72	12
May	188,396	185,135	53,989	242,385	239,124	—3,261	2 91	3 45	54
June	188,910	185,941	54,292	243,202	240,233	—2,969	4 04	5 57	1 52
July	190,821	187,799	54,661	245,482	242,460	—3,022	11 25	11 12	— 13
Aug	192,657	189,294	54,905	247,562	244,199	—3,363	10 17	8 61	—1 56
Sept	194,328	190,880	55,387	249,715	246,267	—3,448	10 44	10 16	— 27
Oct	195,496	191,948	55,842	251,338	247,790	—3,548	7 80	7 42	— 38
Nov	196,287	191,404	56,329	252,616	247,733	—4,883	6 10	— 28	—6 38
Dec	198,988	193,841	56,871	255,859	250,712	—5,147	15 41	14 43	— 98
1973—Jan	200,895	195,040	57,197	258,092	252,237	—5,855	10 47	7 30	—3 17
Feb	200,936	195,234	57,523	258,459	252,757	—5,702	1 71	2 47	77
Mar	200,468	194,834	57,910	258,378	252,744	—5,634	— 38	— 06	31
Apr	200,806	195,082	58,504	259,310	253,586	—5,724	4 33	4 00	— 33
May	203,260	196,899	58,806	262,066	255,705	—6,361	12 75	10 03	—2 73
June	205,119	198,478	59,281	264,400	257,759	—6,641	10 69	9 64	—1 05
July	205,776	199,410	59,506	265,282	258,916	—6,366	4 00	5 39	1 38
Aug	205,985	200,244	59,857	265,842	260,101	—5,741	2 53	5 49	2 96
Sept	205,461	200,002	60,274	265,735	260,276	—5,459	— 48	81	1 29
Oct	206,117	200,790	60,569	266,686	261,359	—5,327	4 29	4 99	70
Nov	208,203	202,386	61,005	269,208	263,391	—5,817	11 35	9 33	—2 02
Dec	209,728	202,868	61,539	271,267	264,407	—6,860	9 18	4 63	—4 55
1974—Jan	210,245	203,110	62,053	272,298	265,163	—7,135	4 56	3 43	—1 13
Feb	211,054	204,632	62,644	273,698	267,276	—6,422	6 17	9 56	3 39
Mar	212,081	205,783	63,230	275,311	269,013	—6,298	7 07	7 80	7 73
Apr	212,771	207,960	63,774	276,545	271,734	—4,811	5 38	12 14	6 76
May	213,162	206,722	64,246	277,408	270,968	—6,440	3 74	—3 38	—7 13
June	214,380	207,858	64,584	278,964	272,442	—6,522	6 73	6 53	— 20
July	214,947	208,084	64,825	279,772	272,909	—6,863	3 48	2 06	—1 42
Aug	215,057	207,234	65,534	280,591	272,768	—7,823	3 51	— 62	—4 13
Sept	215,321	207,633	66,014	281,335	273,647	—7,688	3 18	3 87	69
Oct	215,902	208,413	66,636	282,538	275,049	—7,489	5 13	6 15	1 02
Nov	216,264	208,691	67,337	283,601	276,028	—7,573	4 51	4 27	— 24
Dec	216,469	210,020	67,698	284,167	277,718	—6,449	2 39	7 35	4 95

were tested for two kinds of economic relationships. First, the rate of change of personal income was regressed on the rate of change of each  $M_1$ , lagged 1 to 12 months in 12 different regressions, where the rates of change of both variables covered 6 months at a time. Second, a standard money-demand equation was used to regress each  $M_1$  series on the 3-month Treasury bill rate, gross national product, and a 1-period lagged money stock, where the variables were logarithms of quarterly averages. In both sets of regressions,  $M_1$  calculated by the recommended alternative method gave a slightly better fit. Although not statistically significant, the differences between the regression fits could be interpreted as marginally supporting the recommended method of calculating  $M_1$ .

Thus, on both theoretical and empirical grounds, the alternative method of consolidation of accounts that we suggest seems preferable to the current method. However, since we are not yet sure of all the reasons for the growing discrepancy in  $M_1$  as estimated by the two methods, we recommend the new alternative only tentatively, contingent on the outcome of

the current investigation by the Board's staff of the effects of PEPS and CHIPS, and of other possibly important factors, in estimating  $M_1$ .<sup>13</sup>

### *Remaining sources of error in the treatment of float*

It would be desirable to correct float to exclude the amount of cash items not arising from checks written on private demand deposits. This correction is not made under our tentatively recommended calculation because of the unavailability of the needed data. There is reason to believe, however, that the resulting understatement of the money stock is small. Most of the nondeposit cash items (food stamps, coupons, and credit slips) are quantitatively small. The only large item is U S

<sup>13</sup>Estimating complex concepts by alternative methods often provides differing results, although the figure obtained should be the same whichever way it is estimated. For example, somewhat different estimates of GNP are generally obtained by using the value-added and final-expenditures approaches. In such cases (including  $M_1$ ), it is difficult to say which is the true amount of the concept being calculated.

**TABLE 11 Comparison of Current and Recommended  $M_1$ —Quarterly**  
Seasonally adjusted, amounts in millions of dollars

Period	Demand deposits in --		Currency	Current $M_1$	Recommended $M_1$	Column 5 minus column 4	Annual growth rates (in per cent)		
	Current $M_1$	Recommended $M_1$					Current	Recommended	Column 8 minus column 7
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1968—Q1	148,493	148,651	41,081	189,574	189,732	158			
Q2	151,494	151,334	41,770	193,264	193,104	— 160	7 79	7 11	— 68
Q3	154,694	154,489	42,705	197,399	197,194	— 205	8 56	8 47	— 09
Q4	158,936	158,376	43,528	202,464	201,904	— 560	10 26	9 55	— 71
1969—Q1	160,675	159,723	44,102	204,777	203,825	— 952	4 57	3 81	— 76
Q2	161,607	160,702	44,632	206,239	205,334	— 905	2 86	2 96	11
Q3	162,328	161,423	45,323	207,651	206,746	— 905	2 74	2 75	01
Q4	163,213	162,216	46,127	209,340	208,343	— 997	3 25	3 09	— 16
1970—Q1	165,047	162,633	46,728	211,775	209,361	—2,414	4 65	1 95	—2 70
Q2	166,726	162,363	47,605	214,331	209,968	—4,363	4 83	1 16	—3 67
Q3	170,916	165,379	48,290	219,206	213,669	—5,537	9 10	7 05	—2 05
Q4	172,630	167,333	49,060	221,690	216,393	—5,297	4 53	5 10	57
1971—Q1	176,320	171,550	49,969	226,289	221,519	—4,770	8 30	9 48	1 18
Q2	180,502	175,221	50,931	231,433	226,152	—5,281	9 09	8 37	— 73
Q3	182,359	177,295	51,994	234,353	229,289	—5,064	5 05	5 55	50
Q4	183,076	179,244	52,596	235,672	231,840	—3,832	2 25	4 45	2 20
1972—Q1	187,129	183,760	53,546	240,675	237,306	—3,369	8 49	9 43	94
Q2	188,910	185,941	54,292	243,202	240,233	—2,969	4 20	4 93	73
Q3	194,328	190,880	55,387	249,715	246,267	—3,448	10 71	10 05	— 67
Q4	198,988	193,841	56,871	255,859	250,712	—5,147	9 84	7 22	—2 62
1973—Q1	200,468	194,834	57,910	258,378	252,744	—5,634	3 94	3 24	— 70
Q2	205,119	198,478	59,281	264,400	257,759	—6,641	9 32	7 94	—1 39
Q3	205,461	200,002	60,274	265,735	260,276	—5,459	2 02	3 91	1 89
Q4	209,728	202,868	61,539	271,267	264,407	—6,860	8 33	6 35	—1 98
1974—Q1	212,081	205,783	63,230	275,311	269,013	—6,298	5 96	6 97	1 00
Q2	214,380	207,858	64,584	278,964	272,442	—6,522	5 31	5 10	— 21
Q3	215,321	207,633	66,014	281,335	273,647	—7,688	3 40	1 77	—1 63
Q4	216,469	210,020	67,698	284,167	277,718	—6,449	4 03	5 95	1 92

Treasury checks Although this quantity varies between \$0.5 billion and \$1.5 billion per day, the Board's staff estimates that up to 70 per cent of these checks do not give rise to cash items in collection because they clear the same day, the cash items that Treasury checks do generate are apparently on the order of only \$300 million per day Because of the difficulty of obtaining separate data on these items, no attempt to correct for this overstatement of float is recommended

Since these errors would still remain in the treatment of float, we considered the alternative of not deducting float at all That process would overstate the level of the money stock on a bank-record basis but might give more accurate rates of change through the elimination of fluctuating errors in the float component A test of this supposition is whether variations in the money stock are reduced by eliminating the adjustment for float This test was conducted for monthly money stock data for 1960–73 The standard deviations and coefficients of variation were calculated for  $M_1$ , both including and excluding the various components of float For both levels and rates of change,  $M_1$  adjusted to eliminate float shows substantially smaller variation Other evidence based on fitting standard money-demand regressions for gross and adjusted-for-float concepts of money also leads to a slight preference for the adjusted money stock <sup>14</sup>

## Seasonal adjustment

### *Basic approach*

In many economic series, seasonal variation results from natural causes changes in temperature or rainfall In others, it is a consequence of stable social institutions number of working days in a month, consumer purchases of Christmas tree ornaments In still

others, it is a mixture, in part a result of natural causes or of stable social institutions and in part a consequence of human actions in response to natural phenomena crop yields, fuel consumption, production of Christmas tree ornaments

The approach to the mixed type of seasonal depends on the user's purpose If the analyst is the economic agent who is reacting—the producer of Christmas tree ornaments, for example—he will want to separate clearly the “natural” or “exogenous” seasonal (which is typically outside his own control) from his own reaction to it Given the seasonal in consumer demand for Christmas tree ornaments, he will set his production schedule in light of costs of storage versus costs of bunching production The seasonal in his production schedule will be a “policy” seasonal deliberately arrived at, not a natural seasonal, but it will of course be strongly influenced by the natural seasonal in consumer demand

If a statistician is analyzing business activity, employment, and the like, he will observe the end result of the *combined* natural and policy seasonals of purchasers and producers—for example, in the production of Christmas tree ornaments Insofar as this pattern is repetitive, he may want to abstract from it in order to isolate more sharply the effect of longer-term changes in the output of Christmas tree ornaments If so, he will want to construct a descriptive seasonal, which applies to the actual performance of the series including the results of both natural and policy seasonals

The admixture of “natural,” “policy,” and “descriptive” seasonals is particularly troublesome for the Federal Reserve's seasonal adjustments of monetary aggregates On the one hand, the Fed is faced with such natural seasonals—from its point of view—as fluctuations in retail sales and the associated fluctuation in the desired ratio of currency to demand deposits, corporate tax payment dates, and, on an even more subtle level, the effect on all of these magnitudes of such variables as fluctuations in prices and interest rates On the other hand, it has nearly complete control

<sup>14</sup>These regressions followed the form of those presented in Stephen Goldfeld, “Money Demand Revisited,” *Brookings Papers on Economic Activity*, 1973:3 The regressions cited in the text above were performed for the Committee by Professor Goldfeld The regressions in which the standard definition of  $M_1$  were used had marginally lower standard errors than those not adjusted for various components of float

over the monetary base and through the base over other monetary totals, so it can introduce any policy seasonal it wishes into some one total. For example, it could decide that the base should have no seasonal, in that case,  $M_1$ ,  $M_2$ , and so on would have whatever seasonals are produced in them by the natural seasonals in the relationships linking the base with the other totals. Or alternatively, it could decide that  $M_1$  should have no seasonal, in which case it would have to introduce whatever seasonal in the base is required to eliminate the seasonal in  $M_1$ . Or to be more general, it could use its control over the base to modify seasonals in several totals, given that with one instrument (the base) it can control only some combination of seasonals. Or on an even more general level, it could use other instruments, such as discount rates or reserve requirements, to widen the policy alterations it could introduce into the several seasonals.

In principle, the policy seasonal and the monetary total into which it is to be introduced should be chosen in terms of the objectives one wants to achieve. We have not found any explicit discussion in Federal Reserve releases of the criteria for choosing a policy seasonal. That omission should be remedied.

The evidence suggests that the Fed's policy on seasonals has been designed mainly to offset a natural seasonal in the demand function for money—that is, in the relation among the quantity of money demanded, income, and interest rates. The main policy objective of introducing a seasonal in money has apparently been to reduce the amplitude of the seasonal in interest rates.<sup>15</sup> However, the actual seasonal in the base or other monetary aggregates has apparently not been an explicit policy decision arrived at by combining an explicit, desired, muted seasonal in interest rates with a determination of the seasonal in money required to produce such a seasonal in interest rates. The actual seasonals in the monetary aggregates appear rather to have arisen almost adventu-

<sup>15</sup>This view is supported by the decidedly smaller amplitude of the seasonal in interest rates after the establishment of the Fed in 1914.

ously. Insofar as the Open Market Committee has stated its objectives in terms of monetary totals, it has done so in terms of desired rates of change in *seasonally adjusted* totals. The staff has then computed the changes in seasonally unadjusted totals required to achieve the targets in seasonally adjusted totals. It has done so primarily by calculating a descriptive seasonal for the past and extrapolating into the future.

This procedure may introduce unintended changes in monetary policy, particularly if the descriptive seasonal is calculated by a strictly empirical, mechanical moving seasonal method such as the Census X-11 method. Suppose, for example, a monetary total is expanded in March for several years in sequence by substantially more than the prior seasonal amount—whether because of random disturbances or because nonseasonal policy considerations happen to call for a more rapid expansion. A mechanical seasonal adjustment would tend to incorporate this deviation in the moving seasonal for subsequent years, and the deviation would then be validated by policy decisions expressed in terms of seasonally adjusted totals. The staff has been aware of this problem and for this reason has not simply accepted the X-11 seasonal adjustment, but has made judgmental corrections designed to avoid unintended policy results of the sort just described. However, this seems to us an unsatisfactory procedure.

A more satisfactory procedure would identify explicitly the following items: (1) the seasonal policy objectives—the target seasonals in nominal income or interest rates, (2) the seasonals in  $M_1$  or other totals required to achieve that objective, and (3) the seasonals in Federal Reserve open market operations or other policy instruments required to achieve item (2). At the moment, our knowledge of the relationship between items (1) and (2) is too meager to enable us to allow for anything but major developments altering that relationship. For example, a number of tax law changes culminating in 1968 produced a major alteration in payment dates that clearly required a change in

item (2) to achieve any specified policy objective of the kind listed in item (1)

Making use of the limited available evidence bearing on these issues, the Committee investigated the descriptive seasonal for past years in currency, demand deposits,  $M_1$ , and  $M_2$ . We conclude that, since the changes in tax payment dates culminating in 1968, there has been no economically substantial change in the descriptive seasonal. We therefore regard this average descriptive seasonal as incorporating the Federal Reserve System's present policy.<sup>16</sup>

Individual members of this Committee have divergent views about what the seasonal policy objective of the Fed should be. However, that policy decision is not within the scope of our assignment. In the context of our assignment, we are convinced of the importance of distinguishing the policy seasonal from the descriptive seasonal. Failure to distinguish between the two may lead to incorporation in future monetary changes of seasonal variations from the past that may have been intended or unintended, desirable or undesirable. In this way, the mechanics of seasonal adjustment may unintentionally become determinants of monetary policy.

### Recommendations

Accordingly, we recommend the following:

1. The Fed should choose and publish in advance its best estimate of the seasonals that it intends to use as its guide to policy decisions for some substantial period ahead (say, a year). We suggest also that further research be instituted on the relation between seasonal movements in policy instruments and in monetary totals, and on the relation between seasonal movements in monetary totals and in the more basic objectives of nominal income, real income, and interest rates—in order to improve the basis for policymaking and to permit a more prompt and more accurate allowance for changes in the natural seasonals linking policy instruments with monetary totals, and monetary totals with basic objectives.

2. As a service to persons using such data

<sup>16</sup>More detailed information supporting this conclu-

for research and other purposes, the Federal Reserve should include in its retrospective publication of monetary data seasonally adjusted series incorporating its best estimates of descriptive seasonals.

3. Seasonally unadjusted data should also be published retrospectively for those who want to study past policy or to use other approaches to adjusting for seasonal variation.

These statistical reforms would establish a clear distinction between the policy seasonals and the descriptive seasonals. Any change in the policy seasonals would reflect an explicit decision by the Federal Reserve to change its seasonal objective or to adjust to perceived major changes in natural seasonal forces (as in 1968). But the policy seasonals would not change just because the descriptive seasonal recorded a change in the seasonal pattern of the money stock over recent years.

### Suggested technical change

In investigating past seasonal movements, the Committee developed a statistical method of computing a descriptive seasonal that takes advantage of the availability of daily data and therefore permits allowance in a rather simple fashion for changes in weekly and monthly seasonal factors that reflect the occurrence of holidays, different number of days in the month, and the like.

The first step in the procedure is to allow for the intraweek seasonal, that is, a systematic pattern that makes Monday systematically different from the other days of the week, and so on. This was done by first expressing observations for each day as a ratio to the average for the week of which it is the central day.<sup>17</sup> The averages of these ratios for all Mondays, Tuesdays, and so on, give a day-of-the-week seasonal. Various tests were made to determine whether the day-of-the-week effect varied over

tion is provided in a staff memorandum in the second volume of this Report.

<sup>17</sup>Because most banks are closed on Saturday and Sunday, daily figures for Saturday and Sunday are essentially identical with Friday. Hence, we experimented with both 7 day averages and 5 day averages, which explains the roundabout statement in the text.

the course of the year or from year to year. The evidence thus far indicates essentially constant day-of-the-week effects, so a single correction was used throughout.

The second step was to divide each daily observation by the relevant day-of-the-week factor. The adjusted value for each day was then expressed as a ratio to the average of the 365 days of which it is the central day. A Fourier series was then fitted to these daily ratios, the Fourier terms were arranged in order of amplitude, and the 30 sine or cosine terms with the largest amplitudes were retained. A multiple regression was then fitted expressing the daily ratios as a function of these 30 terms plus 11 dummy variables for days either preceding or on holidays. The value for each day calculated from this regression and then multiplied by the relevant day-of-the-week factor is the seasonal adjustment factor for that day. The ratio of the observed value to the seasonal adjustment factor is the seasonally adjusted daily value. It can be summed for weeks or months to get seasonally adjusted weekly or monthly values.

This procedure was applied for various periods and for individual years. There was a clear break at 1968, but year-to-year differences after 1968 were very small.

The Committee believes that the above procedure offers a number of advantages and that it should be seriously considered as an alternative to the present judgmentally adjusted Census X-11 method of seasonally adjusting money stock data. Each step is clear and simple, which should aid in interpreting and adapting to puzzling circumstances that might be encountered. The use of daily data offers the opportunity to develop efficient statistical estimates and tests and makes it easy to incorporate knowledge of holidays and special events into the procedure. This should make it possible to

reduce substantially troublesome ex-post revisions of historical adjusted data.

This procedure, first suggested by Professor Friedman, was developed in detail by the Board's staff. The Committee encourages continued analysis of this method by the Board's staff and recognizes that useful modifications of it may be found.<sup>18</sup>

### Ownership of demand deposits

Information on ownership of demand deposits by different groups in the economy is also important in understanding the uses made of such deposits by these groups of spenders. In order to understand the role of money in the economy, it is necessary to analyze the demand for money balances. While a great deal of research has been done in this area, it has been seriously hampered by the lack of adequate ownership data.

The Federal Reserve intermittently before 1970 and regularly since that time has collected and published information on the ownership of demand deposits by broad classes of private owners. Although these data do not yet form a long enough historical series to be of great analytical value, their continued collection and publication seem to us important in order to build up an historical series extensive enough to be of analytical value. We recommend, therefore, continued collection of these data and improvement of the series being collected. They should be increasingly valuable over the years ahead.<sup>19</sup>

<sup>18</sup>Further details of the method and the results of applying it to past data are provided in a staff memorandum published in the second volume of this Report.

<sup>19</sup>The case for continuation of the demand deposit ownership survey and suggestions for its improvement are presented in a staff memorandum on this topic in the second volume of this Report.

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## Summaries of Staff Papers

During the course of deliberations by the Advisory Committee on Monetary Statistics, a large number of staff papers were prepared for the Committee by members of the staff of the Board of Governors. Some were written to provide general background information, while others were directed at specific issues. The Committee suggested that some of the studies should be made available to the public. Consequently, the Board of Governors of the Federal Reserve System plans to publish the significant staff papers in a companion volume to this Report of the Advisory Committee on Monetary Statistics.

The staff papers to be published draw on those prepared for the Committee, most reflect an integration of individual studies. In preparing the papers for publication, the Board's staff attempted to include only those materials that had been presented by the staff to the Committee.

The staff papers, of course, do not necessarily reflect the opinions of the Board of Governors of the Federal Reserve System.

The eight papers to be published are summarized below.

### *Transitory Variations in the Monetary Aggregates*

by Agustín Maravall, Darrel W. Parke, and Richard D. Porter

The monetary aggregates are subject to a variety of very short-term transitory influences that impart day-to-day variations (noise) in the series. Though these variations are unrelated to longer term movements in the series, it is useful to isolate their impact on measured growth rates, and this paper explores two empirical methods of estimating such impacts.

One method utilizes daily data, together with a simple analysis of a variance model, to estimate the transitory variance. The second approach is based on a time series analysis of the series. It is

shown that under relatively weak assumptions, the transitory variance can be estimated from the autocovariances of the observed time series. Advantages and pitfalls of each method are examined and illustrated.

### *Foreign Demand Deposits at Commercial Banks in the United States*

by Helen T. Farr, Lance Gorton, Henry S. Terrell, and Thomas Turner

The paper is divided into two parts. The first provides a general description of foreign banks, foreign individuals, partnerships, and corporations, and foreign official demand balances at banks in the United States. This section pays particular attention to institutional arrangements in which foreign commercial banks hold demand balances with commercial banks in the United States to compensate for the clearing and other services provided to these foreign banks by domestic commercial banks.

The second part of the paper attempts to estimate empirical demand relationships for the three types of foreign deposits at commercial banks in the United States. The general empirical results suggest that the three categories of foreign deposits are not empirically related to domestic macroeconomic variables in the same way as domestically owned deposits.

### *Nonmember Banks and Estimation of the Aggregates*

by Darrel W. Parke

Revisions of the estimates of nonmember bank deposits have, in recent years, led to substantial benchmark revisions of the money stock. By using 8 months of daily deposit data for a sample of nonmember banks collected on an experimental

basis by the Federal Deposit Insurance Corporation, this paper explores ways of improving the Federal Reserve's estimating procedure. It is concluded that not enough information is presently available to the Federal Reserve staff on a continuous basis to improve the estimates but that significant improvements could be obtained if more data were available. Such data include (a) deposit data reported on a weekly basis by a sample of nonmember banks similar to those involved in the FDIC experiment, and (b) 7 days of deposit data reported by all nonmember banks on each call report.

### *Seasonal Adjustment of the Monetary Aggregates*

by David Pierce, Neva Van Peski,  
and Edward R. Fry

This paper discusses the problems and concepts involved in seasonally adjusting the money stock and compares alternative methods for doing this, including the development of a daily seasonal adjustment procedure.

The paper includes a discussion of the concept of moving seasonality, including tests on the money stock to examine whether significant changes in seasonal factors have occurred over recent years. A new daily seasonal adjustment procedure is then presented and analyzed. It has the feature that once daily seasonally adjusted data are determined, weekly, monthly, or quarterly seasonal adjustments can immediately be calculated and are consistent with each other. Finally, there is a comparison of four seasonal adjustment procedures: the current procedure, the ordinary and the "fixed-factor" X-11 procedures, and the daily procedure.

### *Demand Deposit Ownership Survey*

by Eleanor M. Pruitt, Helen T. Farr,  
and Arthur Havenner

This paper gives a brief technical description of the demand deposit ownership survey, reviewing the System's experience with the survey over the past 5 years and its potential usefulness for analytical purposes. The paper also presents the results of recent staff research on money demand functions for the various ownership categories.

### *Sources of Data and Method of Construction of the Monetary Aggregates*

by Darwin L. Beck

Information on the various sources of data used in the construction of the historical monetary aggregate measures (1959 to 1975) is provided. This paper describes the various methods used to estimate components of these measures that are not reported or are reported only infrequently. The construction of the narrow money stock measure,  $M_1$ , is discussed in the greatest detail, but information is also provided on the  $M_2$ - $M_5$  measures. The report also includes information on the institutions and types of holders included in each of the monetary aggregate measures.

### *An Alternative Method of Calculating $M_1$*

by Anton S. Nissen (Federal Reserve Bank of New York) and Darwin L. Beck

The first part of this paper discusses the theoretical nature of the alternative method proposed by the Committee for calculating the money stock and presents reasons why it should yield essentially the same results as the current method. It explains how the alternative method should correct for both "cash items bias" and "due from banks bias" in the money stock and, therefore, should simplify the construction of  $M_1$ . The second part of the paper describes the alternative series constructed by the Board's staff and the dilemma produced by the nearly \$80 billion difference between the two series in December 1974.

### *Developing Money Substitutes: Current Trends and Their Implications for Redefining the Monetary Aggregates*

by Steven M. Roberts

In the past several years financial innovations and regulatory changes have increasingly blurred the distinction between demand deposits and savings-type deposits at both bank and nonbank financial institutions. To cite a few of these inno-



vations is sufficient to indicate the trend NOW (negotiable orders of withdrawal) accounts, telephone and third-party transfers from savings accounts, shares of money market mutual funds that can be transferred by check or wire, and transfers via CBCT's (customer bank communication terminals) directly from the customer's to the merchant's savings account for purchases of goods and services. In addition, since mid-1973 banks have been required to impose interest penalties for early withdrawal of time deposits prior to maturity, a requirement that has sharpened the distinction between savings and time deposits. The driving forces behind the changes that have taken place have been increased competition among financial institutions for deposits

(fueled by the lack of demand deposit authority for most thrift institutions) relatively high interest rates that have increased the cost of foregone interest on demand deposits, and the existence of interest rate ceilings on time deposits. In addition to documenting both the changes and their apparent causes, this paper discusses the implications of recent developments for the interpretation of the monetary aggregates as currently defined. In the future  $M_1$  may well tend to reflect a decreasing share of transactions balances while the time deposit share of  $M_2$  will consist of an increasing amount of deposits that are more like securities. Such changes suggest that a new array of monetary aggregates will need to be considered by both monetary policymakers and economists.





