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A Historical Perspective on the Federal Reserve's Monetary Aggregates: Definition, Construction and Targeting

"...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; and (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.

"In general, though by no means uniformly, the broader the concept, the greater the problems of measurement and control."

Improving the Monetary Aggregates (Report of the Advisory Committee on Monetary Statistics), 1976, p. 7.

DATA ON THE MONETARY AGGREGATES are the fundamental raw material of research in many facets of economics and finance. Money demand modelling, measurement of money stock announcement effects, tests of the rationality of preliminary money stock forecasts and financial market efficiency, and comparison of

alternative seasonal adjustment procedures are just a few such areas. Monetary aggregates also are used by Federal Reserve System staff in formulating policy alternatives for the Federal Open Market Committee (FOMC). Perhaps no government data are more important or more widely used in economic and financial research

than the monetary aggregates. Often unappreciated by researchers, however, is the extent to which the appropriate use of monetary aggregates data is intimately connected with changes through time in the data's definitions, construction, revision and publication. A failure to appreciate the interdependence of time, data, definitions and procedures may adversely affect or vitiate research and policy conclusions.

This paper discusses the construction, publication and evolution of monetary aggregates data since the inception of the Federal Reserve System in 1914. In opening their seminal volume on U.S. monetary data, Friedman and Schwartz (1970) set a similar objective:

This book attempts to provide a comprehensive survey of the construction of estimates of the quantity of money in the United States — an activity that dates back almost to the beginnings of the Republic. The survey covers sources, methods of construction, and the end product. (p. 1)

Friedman and Schwartz present a consistent time series of monetary aggregates based on their own data for 1867-1946 and Federal Reserve data through the mid-1960s. This paper and the companion timeline (Kavajecz, 1994) extend Friedman and Schwartz by reviewing the construction and publication of the Federal Reserve's monetary aggregates from 1960 through 1993. We focus on the years since 1960, the period for which the Federal Reserve Board staff currently publishes official monetary aggregates. The interested reader will find few (if any) available descriptions of the Federal Reserve's monetary aggregates comparable to Friedman and Schwartz's narrative.

The evolution of the monetary aggregates as economic statistics has been influenced by both economic thought and statistical practice.¹ Structural change in financial markets and the introduction of new financial instruments require periodic redefinition of the monetary aggregates to accurately reflect the portfolio choices available to households and firms. Never defined nor constructed in the abstract, however, monetary aggregates exist largely as indicators and/or targets of monetary policy. Thus, to an unknown but perhaps considerable extent, selection of the

definitions of the monetary aggregates has been based on the relative ability of alternate aggregates to predict economic activity. Prior to 1980, commercial banks furnished most transaction deposits and their nontransaction deposits seemed to be the closest substitutes for money. In turn, the Federal Reserve's monetary aggregates emphasized both the distinctions between types of deposits and between commercial banks and thrift institutions. The narrower M1 and M2 aggregates first published in 1971, for example, included only deposits at banks, while thrifts were included in M3. These distinctions were preserved in 1975 when M3 was revised and M4 and M5 were introduced.

Perceived breakdowns in the historical relationship between a monetary aggregate and economic activity, reflected, say, in a putative permanent shift in its velocity, may lead to calls for redefinition of the aggregate. Such pressures on M1 and M2 (as initially defined in 1971) were apparent throughout the 1970s. Reinforced by accelerations in inflation and a shift by some macroeconomists toward increased emphasis on the monetary aggregates, these pressures led in early 1974 to the appointment of the Advisory Committee on Monetary Statistics, chaired by professor George Bach of Stanford. By 1980, the Depository Institution Deregulation and Monetary Control Act (DIDMCA) permitted a redefined set of monetary aggregates to be constructed from a greatly expanded, much richer and much more costly flow of data than had ever previously been available. The new aggregates also seemed to have more stable relationships to economic activity. Published analyses at the time of the 1980 redefinition cited with approval the lack of trend in the velocity of the new M2 relative to the old measure, although they stopped short of proposing a less variable long-run velocity as a choice criterion.² Although such pragmatic redefinition seems clearly to be in the spirit of Friedman and Schwartz³, it may account for at least some part of the ex post stationarity of the GNP velocity of M2 (as currently defined) identified by Hallman, Porter and Small (1991).

The ideal monetary aggregate would be composed of assets that are capital-certain (or

¹We do not discuss in this paper the work on aggregation theory and related monetary aggregates such as the Divisia and MQ aggregates. These were consistently labelled by Board staff as experimental and not adopted for policy analysis. The interested reader is referred to Barnett (1980) and Spindt (1985).

²Simpson (1979, 1980). Other descriptions of the construction of the Federal Reserve's monetary aggregates include Broadus (1975), Duprey (1982), Lawler (1977) and Walter (1989).

³See especially chapter 4.

nearly so), highly liquid and closely related to economic activity. Narrow monetary aggregates composed primarily of medium of exchange seem to satisfy at least the first two criteria acceptably well, while broader aggregates do so somewhat less well. Broader aggregates often include assets that are capital-uncertain or, in other words, assets whose market values vary with market interest rates, the pace of economic activity, or expectations of such variables. Broad monetary aggregates are uniformly defined to include the nominal (face) value of capital-uncertain assets rather than the market value, however. Small time deposits included in the non-M1 component of M2, for example, may be taken to be capital-uncertain when there are penalties for withdrawal before maturity.⁴ Money market mutual fund (MMMF) shares, also included in the non-M1 component of M2, appear capital-certain to their holders even though the market value of the funds' assets varies inversely with market interest rates. So long as the MMMFs satisfy a variety of Securities and Exchange Commission rules (including restrictions on the maturity of the funds' assets) and short-term market interest rates don't move too rapidly, the funds need not pass through changes in the market value of their assets to shareholders. The market values of money market instruments included in very broad aggregates such as M3 and (the seldom used) L vary considerably more, however. Such instruments include negotiable large time deposits included in the non-M2 component of M3, and most items included in the non-M3 component of L. Monetary aggregates defined to include the nominal rather than market value of these assets necessarily omit some actual portfolio constraints faced by firms and households, who must necessarily substitute among financial assets at market rather than nominal values. Including these assets in monetary aggregates at market values, however, would cause the *measured* size of the aggregate to vary with market rates. This might reduce the usefulness of the aggregate as an indicator of the impact of policy actions. A policy action that reduced reserve availability could reduce not only the quantity of money demanded as mar-

ket interest rates increased, but also the apparent quantity "supplied" as prices of the included money market instruments fell. The indicator properties of movements in such capital-uncertain monetary aggregates for economic activity have not been established.⁵

The statistical issues in building monetary aggregates also are formidable. If cost were no object, an ideal monetary aggregate would be built from daily observations on all its components at all financial intermediaries. In fact, cost/benefit tradeoffs figure prominently in both data collection and the definition of the aggregates. The Congress has mandated that a cost/benefit analysis be part of each application for renewal of major deposit reports, typically required every three years. Reporting burden is generally to be kept as low as possible while obtaining adequate data for the conduct of monetary policy. This position has led to deposit reporting strategies based on survey sampling wherein deposit coverage and reporting frequency vary by size of institution.

Most of these issues have largely been omitted from the literature on money demand. As fine a work as Laidler's (1993) classic text on money demand fails to discuss the definition, construction or revision of monetary aggregates, except to acknowledge Friedman and Schwartz's research. Nowhere is the reader warned of the potential pitfalls in monetary aggregates data awaiting the unwary. This problem arises largely from the difficulty and high cost to researchers of locating relevant institutional details. This paper attempts to reduce that cost.

SOURCES OF MONETARY AGGREGATES DATA

Throughout U.S. history, every definition of money has been composed primarily of the liabilities of private financial institutions, both notes and deposits. During most periods, these financial institutions have been subject to government regulation. In turn, the primary sources of current and historical monetary aggregates data are government reports filed by these financial institutions.

⁴Under Regulation Q, depositories were required to impose early withdrawal penalties. Many institutions have chosen to continue such penalties even in the absence of Regulation Q. On the demise of Regulation Q, see Gilbert (1986). The liquidity of time deposits has varied through time. Prior to Reg Q, some time deposits were indistinguishable from modern savings and transaction deposits; see Friedman and Schwartz (1970), p. 76-7.

⁵The difficulties of interpreting monetary aggregates that include capital-uncertain instruments are prominent in proposals to include bond and equity mutual funds in a redefined M2. See, for example, Collins and Edwards (1994) and Orphanides, Reid and Small (1993).

The Federal Reserve's first published monetary aggregate appeared in 1943 in Table 9 of *Banking and Monetary Statistics*. The table showed currency, demand deposits and time deposits for June call dates from 1892 to 1922 and for June and December call dates from 1923-41. The sum of currency and demand deposits was defined as "the supply of money" or "means of payment," although it was noted that time deposits often were used for current payments "...during the 1920s." Subsequent data were published in the *Federal Reserve Bulletin*.⁶ Later, Copeland and Brill (1948) presented a series based on the last-day-of-the-month consolidated condition statement of the banking system. In 1949, the Board began monthly publication of this series.

The first modern monetary aggregate based on averages of daily data, labelled M1, was constructed by William Abbott and Marie Wahlig of the Federal Reserve Bank of St. Louis and appeared in the *Federal Reserve Bulletin* in 1960 (Abbot, 1960); a revision was published in 1962 (Abbot, 1962). Building monetary aggregates from daily data is important because seasonal patterns within a month may cause data for individual days to be unrepresentative of both the month's average level and the aggregate's trend growth rate. Abbott and Wahlig's data, which began in 1947, reflected available deposit reports and were shown at half-monthly and monthly frequencies. Member banks had begun reporting in 1944 averages of daily data at the middle and end of each month. Data for nonmember banks and mutual savings banks (MSBs) were estimated from Federal Deposit Insurance Corporation (FDIC) call reports, although the precise interpolation method is not stated.

Monetary aggregates data subsequently were published on the Board's statistical release, known as the *J.3* and entitled *Demand Deposits, Currency, and Related Items*, twice a month from November 1960 through July 1965. The release included averages of daily data at half-monthly and monthly frequencies, seasonally adjusted, and at weekly, half-monthly and monthly frequencies, not seasonally adjusted.⁷ The most recent data included on the release predated the publication date by two weeks.

The *J.3* was succeeded by the current release, known as the *H.6* and entitled *Money Stock, Liquid Assets, and Debt Measures*, on July 30, 1965. It shows averages of daily figures at weekly and monthly frequencies. A revised monetary aggregates series based on weekly averages of daily data beginning in 1959 was later presented by Fry, Beck and Weaver (1970).⁸ The current definitions of the monetary aggregates were largely established in 1980; see Kavajecz (1994) and Simpson (1979, 1980). At the time of the redefinition, monetary aggregates based on the new definitions were constructed back to 1959. Details of their construction are discussed in the appendix.

For researchers, monetary data extracted from individual issues of the *J.3* and *H.6* releases provide contemporaneous estimates of the monetary aggregates based on a well-defined information set: the data available to Board staff as of the publication date. These statistical releases allow a researcher interested in announcement effects or the policy formation process of the FOMC to observe Federal Reserve Board staff estimates of the level of the money stock at each point in time, or permit a researcher interested in market efficiency or the "rationality" of initial money stock estimates to study the timing and extent of revisions to initially published data. The statistical releases are not very useful for longer-run studies, however, because the information set underlying the release changes each week as Board staff receives both new data and revisions to previously reported data. Further, the definitions of the monetary aggregates have changed through time.

While the Federal Reserve Board has published a number of historical volumes, each with unique features making it a valuable source of data, use of these data also is complicated by varying definitions and observational frequencies. Ideal historical data would be computed at similar frequencies under consistent definitions. The two most comprehensive volumes, *Banking and Monetary Statistics* and *Banking and Monetary Statistics 1941-1970*, were published by the Federal Reserve in November 1943 and September 1976,

⁶For details, see the introductory notes to section 1 in *Banking and Monetary Statistics* and the notes to chapters 1-4 in *Banking and Monetary Statistics 1941-1970*.

⁷Member banks began reporting daily data each week in December 1959. For years after 1959, the weekly data were prorated to obtain monthly and half-monthly frequencies.

⁸Some independent researchers have attempted to build monetary aggregates data for earlier periods using current definitions. For a careful discussion of the issues, see Rasche (1987, 1990).

respectively.⁹ Observational frequency differs across data series, with various data at monthly, weekly or daily frequencies. There are also important conceptual distinctions through time in the data, such as the difference between member and nonmember banks and the difference between thrifts and commercial banks. When using data from other sources in conjunction with the *Banking and Monetary Statistics* volumes, researchers should appreciate that data published subsequently are not strictly comparable, since more recent publications incorporate further revisions to the data.

A closely related publication, and the yearly counterpart to the *Banking and Monetary Statistics* volumes, is the *Annual Statistical Digest*. The *Digest* is released at the end of each year and contains data for the previous year. The Board's *Annual Report* also contains information about the monetary aggregates, but the information tends to be more descriptive than numerical. These publications provide a long-run, consistent perspective of the monetary aggregates over their respective published date ranges, since within each issue of each publication the observations are based on a single, consistent information set. They perhaps are less appropriate, however, for lines of research where the hypotheses depend on the information set used in constructing the money stock estimate, since the date the estimate was formulated is not explicitly given.

Similar concerns suggest that data sets constructed from various issues of the *Federal Reserve Bulletin* may not be suitable for a variety of research. Board staff have published components of the monetary aggregates, such as demand deposits and currency, in the *Bulletin* since its inception in May 1915. In February 1944, the staff first showed demand deposits and currency in the same table, foreshadowing the later M1 monetary aggregate. While the *Bulletin's* current Table 1.10 (first published in its present form in January 1977) descends from the 1944 table, the data published in this table through the years are not a consistent time series due to definition changes, reporting changes,

annual benchmark revisions, and reestimation of seasonal adjustment factors. At the same time, the *Bulletin* is an excellent resource for tracking the various changes that have occurred in the definitions and construction of the monetary aggregates through time. Due to its somewhat longer time span, data extracted from various issues of the *Bulletin* illustrate how the monetary aggregates have evolved; occasional articles have presented detailed information on changes in the monetary aggregates. Unfortunately, like many other Federal Reserve historical publications, the *Bulletin* does not specify the date at which the estimates were made, that is, the time-indexed information set on which they were based. In general, data in the *Bulletin* precede by two months the *Bulletin's* publication date, but at times it has been longer. Since monetary aggregates data appear with differing lags in various System publications (for example, 10 days on the *H.6*), data from different sources may be based on quite different information sets even when the dates that they first appear in print are close together. This suggests that, in general, a database built from one Federal Reserve source or publication should not be updated from another.

Finally, a publication that presents comprehensive, consistent time series is *Money Stock Revisions*.¹⁰ This publication is offered to the public early in each year as a supplement to the issue of the *H.6* release that incorporates the Board staff's annual benchmark revisions, including reestimated seasonal adjustment factors. The publication presents a comprehensive set of monetary aggregates data, beginning in 1959 for monthly data and in about 1975 for weekly data.¹¹ Unlike other Board staff publications, the information set and definitions used in constructing the data are well-defined, making the data ideal for longer-run studies. Note, however, that since each year's publication uses that year's current definitions — and the definitions of the monetary aggregates and their components have changed through time — the data may differ significantly from previously published data.

⁹The 1943 edition of *Banking and Monetary Statistics* was reprinted in August 1976. See also the Board's corrected 1959 reprint of *All-Bank Statistics*.

¹⁰The title of this publication has changed somewhat through time. It currently is produced by the Money and Reserves Projections Section of the Division of Monetary Affairs. Prior to 1988, it was produced by the Banking Section of the Division of Research and Statistics. Prior to 1993, the printed publication was offered to the public as a supplement

to the issue of the *H.6* release that contained the newly benchmarked monetary aggregates data; data in machine readable form were sold by the National Technical Information Service of Springfield, Virginia. In 1993, the publication and associated data were first offered for sale by Publications Services at the Board of Governors.

¹¹Subject to the availability of the particular series. See Table 2 for the availability of specific series.

DATA COLLECTION

The data collection process is the foundation of the construction of monetary aggregates data. The collection of data useful for the monetary aggregates has changed (and improved) dramatically during the last eight decades. We present here a brief outline of the principal data inflows to the Federal Reserve during a small number of distinct periods over which data collection and publication practices differed significantly.

1915-43

The data collected during this period have been extensively documented by Friedman and Schwartz (1970), chapters 12-15. Beginning in 1923, data for all member banks are available. From April 1923-December 1928, the Federal Reserve collected and published deposits as of a single day each month; from January 1929-March 1944, monthly averages of daily data; after March 1944, averages of daily data were collected twice a month. Data also continued to be reported each week on Wednesday by a sample of several hundred weekly reporting banks that held a majority of bank deposits. Data for non-member banks and for MSBs were available on call reports.

1944-80

Averages of daily member bank deposit data were collected twice a month through December 1, 1959, when weekly averages began to be collected. Regular publication beginning in November 1960 of monthly money stock figures on the *J.3* release necessitated estimates of the monetary liabilities of nonmember banks. Nonmember bank data continued to be collected on call reports, typically two per year until 1960, when thereafter four per year were required.

1980-Present

Perhaps the least appreciated aspect of the Monetary Control Act of 1980 was a significant

improvement in the quantity and quality of data flowing to the Federal Reserve. A watershed in data collection, the act empowered the Federal Reserve System to impose reporting requirements on all depository institutions with reservable liabilities above a prescribed minimal amount. The act significantly eased estimation of the money stock, as deposit reporting by financial institutions became nearly universal and was no longer a function of membership status or charter type.¹² Two years later, in the Garn-St. Germain Act, Congress mandated that the Federal Reserve establish guidelines to ease reporting burden borne by financial institutions while maintaining adequate coverage of the outstanding monetary liabilities of the banking system. In response, a system of reporting categories was established wherein the reporting burden — measured by frequency of reporting and number of items reported — depends upon both total deposits and reservable liabilities.

Under this system, the Federal Reserve Board staff each year establishes a cutoff level of total deposits and an exemption level of reservable liabilities. Increases in both levels are indexed to the year-over-year increase in aggregate deposits at all depository institutions as calculated from second quarter (June 30th) call reports.¹³ Table 1 summarizes the System's reporting categories and the type/frequency of report submitted by financial institutions in each category for 1992, 1993 and 1994.¹⁴ The deposit cutoff and reserve exemption levels were established at \$25.0 and \$2.4 million, respectively, beginning January 1985. These have subsequently been indexed each year, based on 80 percent of the growth in aggregate deposits, except in 1988. In that year, Board staff research suggested that little accuracy would be sacrificed, and a significant reporting burden reduced for smaller institutions, by increasing the deposit cutoff more rapidly. The deposit cutoff, which had automatically increased in January to \$30 million from the previous year's \$28.6 million,

¹²In particular, thrift institutions and nonmember banks began reporting deposits weekly to the Federal Reserve.

¹³A zero reserve requirement ratio applies to the reserve exemption amount of deposits. The reserve exemption amount is not to be confused with the low reserve tranche. The tranche allows a lower 3 percent reserve requirement ratio to be applied to some portion of deposits, while a higher ratio (currently 10 percent) applies to the balance. Both the reserve exemption amount and the low reserve tranche are indexed. For 1993, the reserve exemption and

low reserve tranche amounts are \$3.8 and \$46.8 million, respectively. For 1994, the amounts are \$4.0 and \$51.9 million, respectively.

¹⁴Values for each year are typically published in the respective January issues of *Federal Reserve Bulletin*. Values for 1992, 1993 and 1994, for example, appear on pp. 36-7, 18 and 23-4 of the January 1992, 1993 and 1994 issues, respectively.

Table 1

Depository Institution Reporting Categories 1992-94 by Deposit Cutoff and Reserve Exemption Amount

Amounts effective as of January 1992 (1993) [1994]	Reserve Exemption Amount reservable liabilities		
	Deposit Cutoff total deposits	if more than \$3.6 (\$3.8) [\$4.0]	if less than \$3.6 (\$3.8) [\$4.0]
	if more than \$44.8 (\$44.8) [\$44.8]	the institution must file the FR2900 report weekly	the institution must file the FR2910Q report quarterly
	if less than \$44.8 (\$44.8) [\$44.8]	the institution must file the FR2900 report quarterly	the institution might be exempt from reporting

Note: All figures are in millions of dollars.

was raised in September to \$40.0 million. Several thousand smaller banks were exempted from weekly reporting by this change.

Institutions that file the FR2900 at a *weekly* frequency (Table 1, the upper left-hand box) report daily levels for about a dozen deposit and nondeposit liabilities. Institutions falling in the other boxes have a sharply reduced reporting burden. Institutions that file the FR2900 at a *quarterly* frequency (the lower left-hand box) report the same items but only for a single week each quarter (the week that contains the third Thursday in the last month of the quarter). Institutions that file the FR2910Q (upper right-hand box) report weekly average data on fewer items for one week each quarter. Institutions in the lower right-hand box of Table 1 are exempt from filing reports with the Federal Reserve if and only if Federal Reserve staff are able to accurately obtain required data from other sources, such as call reports.¹⁵ For institutions other than weekly reporters (all categories except those in the upper left-hand box), Federal Reserve Board staff must estimate their deposits during the periods between reports. In 1992, daily data were received each week from approximately 9,100 financial institutions, about 30 percent of all depositories. These data comprised about 90 percent of the aggregate deposits included in the monetary aggregates (the balance being estimat-

ed), or, including nondeposit liabilities, about 80 percent of the aggregate liabilities of financial institutions included in the monetary aggregates.

Construction of weekly values of broad monetary aggregates such as M2 and M3 also relies on a variety of weekly reports of data for nondeposit liabilities such as repurchase agreements (RPs), Eurodollar deposits, and reports from nonbank financial institutions such as MMMFs. The numerous sources and reports used by Board staff in the construction of the monetary aggregates are shown in Table 2. In general, broader aggregates such as M2 and M3 are less precisely measured than M1 because a larger proportion of the data included in the aggregate is either not reported directly to the Federal Reserve, and/or is reported less frequently than the data included in M1. In addition, a larger number of various nonmoney stock items are netted out of the broader aggregates.

In the non-M1 components of M2 and M3, MMMF shares have been among the more complex items. A dynamic industry characterized by rapid growth, new funds have frequently appeared and old ones vanished. In addition, funds may merge, change names or change investment objective by, say, lengthening the maturity of their assets to become a short-term bond fund. All these events complicate accurate

¹⁵If not, the institution is required to file an annual report.

Table 2

Information about the Definition, Availability and Source Data for the Monetary Aggregates

This table provides information on the construction of the monetary aggregates M1, M2, M3 and L as of October 1993. Readers are cautioned that some definitions and data sources may differ in earlier periods. Each aggregate reflects the amounts of the designated assets held by the nonbank public, which includes households, businesses and government entities other than the U.S. Treasury. Assets issued in the U.S. are included whether they are held by foreign or domestic residents. Certain dollar-denominated assets issued abroad and held by U.S. residents also are included. The aggregates are constructed by consolidation rather than aggregation, such that the liabilities of one money stock issuer that are held by another issuer within the same aggregate cancel each other. For example, the amount of large time deposits held by money market mutual funds is subtracted from gross large time deposits in building M3, because these deposits are both a liability of one money stock issuer (banks) and an asset of another (money market mutual funds).

Monetary aggregates published by the staff of the Board of Governors as of October 1993 were:

M1 = currency + checkable deposits;

M2 = M1 + certain nontransaction deposits and other liquid assets;

M3 = M2 + certain assets that are either less liquid and/or issued in large denominations; and

L = M3 + certain money market instruments.

Federal Reserve System reports are referred to below by the prefix FR and reports of the interagency Federal Financial Institutions Examination Council by the prefix FFIEC. Call reports are administered by the FFIEC, a joint agency including the Federal Reserve, the Federal Deposit Insurance Corporation (FDIC), the Treasury Department and the National Credit Union Administration (NCUA). Complete report titles and reporting frequency are shown only the first time a report is cited; references thereafter are abbreviated.

Money Stock Component	Definition	NSA published data begin		Source of Information
		monthly	weekly	
M1 =		1/59	1/6/75	Federal Reserve Board staff have judged that adequate data are not available before these dates to construct monetary aggregates based on current definitions.
(+) Money stock currency =	Currency held by the nonbank public (in other words, held outside the U.S. Treasury, Federal Reserve Banks and the vaults of depository institutions).	1/59	1/6/75	
(+) Currency in circulation	Currency held outside the U.S. Treasury and Federal Reserve Banks.			Federal Reserve Statement of Condition (internal Fed balance sheet) (FR34), daily; Treasury and Mint Reports on currency and coin in circulation.
(-) Vault cash	Cash held by depository institutions (including cash in automatic teller machines).			Report of Transaction Accounts, Other Deposits and Vault Cash (FR2900), from weekly and quarterly reporters; Quarterly Report of Selected Deposits, Vault Cash and Reservable Liabilities (FR2910Q); Annual Report of Total Deposits and Reservable Liabilities (FR2910A); Consolidated Reports of Condition and Income (call reports) (FFIEC 031, 032, 033, 034), quarterly, last business day of the quarter. The FR2900 is the core report for the monetary aggregates. More than 9,000 financial institutions file the FR2900 report weekly following their Monday close of business, each report containing daily deposit data for the preceding week. Some smaller institutions file the FR2900 report only for one week each quarter. See the text for discussion.

Money Stock Component	Definition	NSA published data begin		Source of Information
		monthly	weekly	
(+) Travelers checks	Outstanding amount of U.S. dollar-denominated travelers checks issued by nonbanks (checks issued by banks are included in demand deposits).	1/59	1/6/75	Monthly Report of Travelers Checks Outstanding (FR2054), last business day of the month; weekly data are interpolated from seasonally adjusted monthly data.
(+) Demand deposits adjusted =	Demand deposits at all depository institutions in the U.S. other than those due to other depositories (including money market mutual funds [MMMFs]), the U.S. government, and foreign banks and official institutions, less cash items in the process of collection (CIPC) and Federal Reserve float.	1/59	1/6/75	
(+) Gross demand deposits	Deposit liabilities of banks payable on demand; time deposits with original maturity of less than seven days; travelers checks and money orders that are the primary obligation of the issuing depository institution.			FR2900; FR2910Q/A; call reports
(-) Demand deposits due to depository institutions, foreign banks and official institutions, and the U.S. Treasury				Weekly Report of Assets and Liabilities for Large Banks (FR2416), includes about 160 large banks, weekly, close of business Wednesday; call reports for other depositories, quarterly, last business day of quarter.
(+) Other money orders	Money orders and official checks issued by nonbank subsidiaries or bank holding companies.			Weekly Report of Money Orders and Similar Payments Instruments issued by Nonbank Subsidiaries of Bank Holding Companies (FR2053), close of business Monday.
(-) Cash items in process of collection	Third-party payment instruments (checks) redeemable in immediately available funds if presented today.			Same as gross demand deposits; all checks being collected are deducted from demand deposits regardless of the type of account wherein the deposit was made.
(-) Float on the Federal Reserve				FR34
(+) Other checkable deposits	NOW and automatic transfer service (ATS) accounts at commercial banks, U.S. branches and agencies of foreign banks, and Edge Act corporations; NOW and ATS accounts at thrifts; credit union share draft balances; and demand deposits at thrifts.	1/63	1/6/75	FR2900; FR2910Q/A; call reports, quarterly

Money Stock Component	Definition	NSA published data begin		Source of Information
		monthly	weekly	
Non-M1 component of M2 =		1/59	1/5/81	Adequate weekly thrift data are not available before 1981; see Appendix 1 for discussion of monthly thrift data for 1959-80.
(+) Savings deposits, net =	Passbook and statement savings deposits plus money market deposit accounts (MMDA) other than those due to general purpose and broker/dealer money market funds, foreign banks and official institutions and the U.S. government. MMDAs are a special type of savings account that permits a small number of third-party payments per month.	1/59 12/82* (*MMDAs)	11/3/80 12/20/82*	MMDAs were first authorized in December 1982; separate savings and MMDA data were collected until September 1991. Thereafter, only a single combined series has been collected.
(+) savings and MMDA deposits at banks and thrifts	Deposit or account in which the depositor is not currently, but may be at any time, required by the financial institution to give written notice of intent not less than seven days prior to withdrawal.			FR2900; FR2910Q/A; call reports
(-) savings and MMDA deposits due to foreign banks, foreign official institutions and the U.S. Treasury				FR2416; call reports
(+) Adjusted small time deposits =	Deposits, including retail repurchase agreements (RPs), issued in amounts of less than \$100,000 with original maturities of seven days or more, less all IRA/Keogh retirement account balances at banks and thrifts.	1/59	11/3/80	
(+) gross small time deposits				FR2900; FR2910Q/A; call reports
(+) retail RPs at commercial banks and mutual savings banks (MSBs)	Retail RPs are issued in small denominations most often to households and small businesses.			Monthly Survey of Selected Deposits (FR2042), last Wednesday of the month.
(+) retail RPs at savings and loan associations				Office of Thrift Supervision; quarterly thrift balance sheet
(-) IRA/Keogh balances at commercial banks and MSBs				FR2042
(-) IRA/Keogh balances at savings and loan associations				Office of Thrift Supervision; quarterly thrift balance sheet

Money Stock Component	Definition	NSA published data begin		Source of Information
		monthly	weekly	
Non-M1 component of M2 = (continued)				
(+) Share balances in general purpose and broker/dealer MMMFs	MMMFs are certain types of investment companies that agree to abide by the SEC's Rule 2a-7 and a variety of other regulations regarding the types and maturities of allowable assets. Shares in these funds may be held by households, businesses and various institutions.	1/74	2/4/80	The Investment Company Institute (ICI) voluntarily collects information for the Federal Reserve. Weekly and monthly reports cover both the funds' liabilities (shares) and assets. The amounts of individual assets held by MMMFs are important because most assets—including RPs, Eurodollars, large time deposits and Treasury bills—are netted from the monetary aggregates during the consolidation of M2, M3 or L. Data are labeled by Federal Reserve staff as the Weekly (Monthly) Report of Assets of Money Market Mutual Funds [FR2051a (FR2051b)]; Weekly Report of Assets for Selected Money Market Mutual Funds (FR2051c); or the Weekly Report of Overnight Eurodollars for Selected Money Market Mutual Funds (FR2051d). The ICI data are as of close of business on Wednesday. The Wednesday level is included in the aggregate for the week ending the following Monday. For example, M2 and M3 for the week of January 10, 1994, contained data on MMMF shares as of Wednesday, January 5.
(+) Overnight RPs, net =	One-day and continuing-contract RPs issued by all depository institutions to other than depository institutions, MMMFs and foreign official institutions.	11/69	1/6/75	
(+) gross overnight RPs	RPs as of close business, one day each week			Report of Selected Borrowings (FR2415), for commercial banks, weekly, close-of-business Monday; Weekly Report of Repurchase Agreements on U.S. Government and Federal Agency Securities with Specified Holders (FR2415t), for thrifts, close of business Monday
(-) overnight RPs held by MMMFs				FR2051a, c
(+) Overnight Eurodollars, net =	Eurodollar deposits with original maturity of one day issued by foreign branches of U.S. banks worldwide to U.S. nonbanks (U.S. addresses other than depository institutions and MMMFs)	2/77	12/31/79	
(+) gross overnight Eurodollars				Report of Selected Deposits in Foreign Branches held by U.S. Addresses (FR2050), weekly reporting of daily data, close of business Monday; Monthly (Quarterly) Report on Foreign Branch Assets and Liabilities [FR2502, (FR2502s)], last business day of the period
(-) overnight Eurodollars held by MMMFs				FR2051a, c

Money Stock Component	Definition	NSA published data begin		Source of Information
		monthly	weekly	
Non-M2 component of M3 =		1/59	1/5/81	
(+) Large time deposits, net =	Deposits issued by banks and thrifts in amounts of \$100,000 or more with initial maturities of seven days or more, other than those held by MMMFs, other depository institutions, and foreign banks and official institutions	1/59	11/3/80	
(+) gross large time deposits				FR2900; FR2910Q/A; call reports
(-) large time deposits due to foreign banks and official institutions, and the U.S. Treasury				FR2416; call reports, quarterly
(-) large time deposits held by MMMFs				FR2051a, c
(-) mortgage-backed bonds at savings and loan associations	Mortgage-backed bonds are reported as a reservable liability on the FR2900. They are not deposits, however, and, hence, are subtracted from the monetary aggregates.			Office of Thrift Supervision, Statement of Condition (call report), quarterly
(+) Term RPS, net =		10/69	1/6/75	
(+) gross term RPs	RPs issued by all depositories with original maturities greater than one day, other than continuing contract and retail RPs and RPs issued to other depositories and foreign banks and official institutions.			FR2415
(-) term RPs held by MMMFs				FR2051a, c
(+) Term Eurodollars, net =		1/59	12/31/79	
(+) gross term Eurodollars	Eurodollar deposits due to U.S. nonbank addresses with maturity longer than one day at all foreign branches of U.S. banks and at offices of non-U.S. banks in the U.K. and Canada			FR2050; FR2502; data furnished by the Bank of England and Bank of Canada
(-) term Eurodollars held by MMMFs				FR2051a, c

Money Stock Component	Definition	NSA published data begin		Source of Information
		monthly	weekly	
Non-M2 component of M3 = (continued)				
(+) Shares in institution-only (I-O) MMMFs, net =		4/74	2/4/80	
(+) shares in I-O MMMFs, gross	MMMFs that under SEC guidelines require large minimum investments (typically \$50,000 +) and sell shares only to sophisticated investors and institutions, thereby gaining exemption from certain SEC accounting rules. These shares may be held by households, businesses or institutions.			FR2051a, c
(-) overnight RPs and Eurodollars held by I-O MMMFs	Note that term RPs and Eurodollars held by MMMFs were netted above.			FR2415 for banks; FR2415t for thrifts
Non-M3 component of L =		1/59	NA	
(+) Bankers acceptances, net =	Bankers acceptances held by the nonbank public other than accepting banks, Federal Reserve Banks, foreign official institutions, Federal Home Loan Banks and MMMFs.	1/59	NA	
(+) gross bankers acceptances				Monthly Survey of Eligible Bankers Acceptances (FR2006), monthly, last day of the month; call reports, quarterly
(-) acceptances held by Federal Reserve Banks				FR34
(-) acceptances held by MMMFs				FR2051a, c
(+) Commercial paper, net =	Commercial paper held by the nonbank public other than MMMFs.	1/59	NA	
(+) gross commercial paper				Report of Commercial Paper Outstanding Placed by Brokers and Dealers (FR2957a), weekly, Wednesday; Report of Commercial Paper Outstanding Placed Directly by Issuers (FR2957b), weekly, Wednesday and last day of the month
(-) commercial paper held by MMMFs				FR2051a, c

Money Stock Component	Definition	NSA published data begin		Source of Information
		monthly	weekly	
(+) Short-term U.S. Treasury securities, net =	Treasury bills and coupons with remaining maturities of less than 12 months held by the nonbank public other than depositories, Federal Reserve Banks, MMMFs, and foreign banks and official institutions.	1/59	NA	
(+) gross short-term Treasuries				Monthly Statement of Public Debt, U.S. Treasury Department
(-) Federal Reserve Bank holdings of short-term Treasuries				FR34 FR2051a, c
(-) MMMF holdings of short-term Treasuries				
(+) U.S. savings bonds	U.S. government savings bonds held by the nonbank public.	1/59	N.A.	Monthly Statement of Public Debt, U.S. Treasury Department

SOURCE: Compiled by the authors from published and unpublished Federal Reserve documents.

measurement of the aggregate amount of MMMF shares held by the nonbank public. Retirement accounts (IRA/Keogh) at banks, thrifts and MMMFs also have sometimes been nettlesome. These deposits, netted from the monetary aggregates, are not collected in the same manner as other deposit data included in the aggregates. As shown in Table 2, retirement balances at banks are collected in the FR2042 report. This report surveys fewer banks less frequently than the FR2900 report that provides most deposit data. Retirement balances at MMMFs are collected by the Investment Company Institute from member mutual funds and, like data for commercial banks and thrifts, lags somewhat behind the reporting of deposits and other liabilities included in the aggregates.

Measurement problems also arise regarding Eurodollars and RPs. High-quality timely data are available on the overnight Eurodollar component of M2 because these deposits are largely held at Caribbean branches of U.S. banks.¹⁶ Term Eurodollars held in foreign branches of U.S. banks are reported on approximately the same basis. Term Eurodollars, however, also are held extensively at non-U.S. banks in England and Canada, not subject to Federal Reserve reporting. The Bank of England and the Bank of Canada collect quarterly data for U.S.-dollar denominated deposits due to U.S. nonbank addresses. Although aggregate totals are given to Federal Reserve staff, data for individual banks are confidential and, hence, can neither be checked nor edited by Federal Reserve staff.¹⁷

For RPs, the problem is more a conceptual issue than a matter of data reporting. Overnight RPs are included in the non-M1 component of M2 because, at least in part, they are an attractive alternative to holding transaction balances. RPs with maturity of more than one day also, of course, may serve the same purpose. RPs with a maturity longer than one day, however, are reported as term RPs and included in the non-M2 component of M3. An investor who accepts a two-day RP contract rather than a sequence of two, one-day contracts may reduce the size of

M2 without any economic significance. It seems likely that much of the predictable part of such switches, say, due to holiday weekends, is captured in the seasonal adjustment factors. The balance remains as statistical noise.

Overall, weekly first-published values of M2 and M3 shown on the current H.6 release are based about 80 percent on data that are reported weekly, with the balance estimated from lesser frequency reports.¹⁸

MAJOR OPERATIONS BY BOARD STAFF THAT AFFECT THE MONETARY AGGREGATES

In addition to the principal sources of data, well-informed researchers should be aware of the more important revision practices and schedules used by Federal Reserve Board staff that affect the continuity of the data. Benchmarks, seasonal factor reestimation and definition changes may have significant impacts on the monetary aggregates and, correspondingly, on research employing that data.

Benchmark Revisions

All monetary aggregates data are subject to a "benchmark" revision annually. In its most general form, a benchmark of the monetary aggregates by Board staff would be (ideally) a measurement of the universe of money stock issuers and their holdings of monetary liabilities. A benchmark serves three main purposes. First, it allows Board staff to incorporate deposit data on institutions that are exempt from reporting directly to the Federal Reserve. These data are obtained either from bank and thrift call reports or from other annual reports filed by the institutions. Second, it allows the incorporation of corrected/revised data submitted by depository institutions throughout the year. Third, it allows staff to update estimates of some nondeposit components of the aggregates.

Depository institutions generally submit revised deposit data throughout the year. Such

¹⁶In fact, these deposits are recorded in New York while being legally booked through "nameplate" branches in the Caribbean (so-called because the office largely consists of a brass nameplate).

¹⁷In addition, few statistics are available for coverage ratios, error rates, and so on.

¹⁸Detailed estimates of such coverage ratios are prepared about every three years and furnished to the Office of Management and Budget as part of the reauthorization process for the report. See Walton and others (1991).

data from weekly reporting institutions are incorporated into the monetary aggregates published on the *H.6* release only during the first three weeks following the week in which the report was due, that is, the four most recent weeks shown on the *H.6* release. Deposit data submitted after that time are held in abeyance and incorporated at the annual benchmark, along with data received from institutions that report only once per year. (Deposit data received from quarterly reporting institutions are incorporated when received during the year, as are nondeposit data received from many sources. See Table 2.) This three-step process begins with aggregation of all deposit data reported by financial institutions during the past six or seven years. Next, data are matched to call reports for all depository financial institutions to identify missing institutions (if any) and obtain deposit levels at the call dates for those institutions exempt from filing deposit reports with the Federal Reserve. Finally, miscellaneous data collected during the year regarding items not covered by deposit reports are incorporated.

Benchmarks constitute a clear break-in-series for monetary aggregates data, changing significantly not only past data but altering the base upon which new estimates will be published during the coming year. Since 1964, a benchmark of the monetary aggregates has been done at least annually. In recent years, Board staff have published the benchmark data prior to the February Humphrey-Hawkins testimony of the Federal Reserve Chairman before Congress. From 1974 through 1980, however, benchmark revisions of the monetary aggregates were conducted approximately every quarter. The increased frequency of benchmarks addressed a concern, raised by the Bach Commission, that the methods used at the time to estimate nonmember bank deposits could introduce a bias into the monetary aggregates. It was felt that more timely benchmarks would serve to keep the Federal Reserve's estimates more closely aligned with the true, unobserved figures. This was not a new concern, however, and in fact all benchmarks prior to the Monetary Control Act had focused heavily on nonmember bank deposits, since these institutions were not required to report to the Federal Reserve.¹⁹ The power to enforce near-universal reporting that

was endowed on the Federal Reserve by the Monetary Control Act obviated the need for frequent benchmarks after 1980. Today, benchmarks focus on special items not covered on deposit reports.

The effects of these revisions on quarterly growth rates of the monetary aggregates are shown in the first page of Table 3. The columns of the table correspond to the annual benchmarks published in early 1986-93. Each entry in the table is the change in the annualized growth rate of the corresponding monetary aggregate during that quarter due to revisions of the underlying source data. The largest revisions due to any benchmark occur in the most recently completed year, shown as the shaded areas in the table. Revisions for prior years, not shaded, are smaller. While not following a consistent pattern, the data suggest that any particular quarter may be revised significantly, especially for the broader aggregates. In part, the latter are related to the higher percentage of non-deposit components in those aggregates.

Seasonal Adjustment

Seasonal adjustment of the monetary aggregates has long been an important area of research. The FOMC formulates its monetary policy in terms of seasonally adjusted data, and both the public and policymakers often take recent movements in adjusted data as indicating the underlying trend growth rate of the monetary aggregates.

Seasonal adjustment methods attempt to separate recurring calendar-related patterns in data (due to, say, calendar dating, payroll schedules, tax filing deadlines, and so on) from random shocks and the underlying trend. In general terms, the data generating process for the monetary aggregates is assumed to be well represented as the product of three components: a time-varying trend, a time-varying seasonal and an irregular.

Each year, Board staff publish revised seasonal factors for most historical periods and projected seasonal factors for the upcoming year. With few exceptions, these seasonal factors are based on, and published simultaneously with, the an-

¹⁹The quarterly deposit data reported on the call reports by nonmember banks also were not without problems. The definitions of "deposits" differ somewhat between the Fed's Regulation D and the call report instructions, making the

data not fully comparable. For earlier analyses of the effect of benchmark revisions, see Lang (1978) and Simpson and Williams (1981).

Table 3

Page 1: Revisions to Previously Published Quarterly Growth Rates of the Monetary Aggregates (s.a.) Due to Benchmark Data Revisions

Periods	Year of annual benchmark (usually published in February; see Kavajecz, 1994)																							
	1986			1987			1988			1989			1990			1991			1992			1993		
	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3
1984 Q4	0.4	0.6	-0.2	0.4	0.5		-0.6	-1.2		0.1	0.0		-0.1	0.2		0.0	-0.1		0.0	0.0		0.1	0.1	
1985 Q1	0.1	-0.4	-1.0	-0.2	-0.3		-0.4	-0.1		0.0	0.0		0.0	0.0		0.0	-0.1		0.0	0.0		0.0	0.0	
Q2	0.1	0.3	-0.3	0.2	0.0		-0.1	0.2		0.0	0.0		0.1	-0.1		-0.1	-0.2		0.0	0.0		0.0	0.1	
Q3	0.1	0.0	0.0	0.1	0.2		0.0	0.2		0.1	0.1		-0.1	-0.1		0.0	-0.2		0.0	0.0		0.0	0.1	
Q4	0.6	-0.1	-0.6	0.5	0.8	0.5	0.2	-0.1		-0.1	-0.1		0.0	0.0		-0.1	-0.1		0.0	0.0		0.0	0.0	
1986 Q1				0.1	0.0	0.0	0.1	0.7		0.0	-0.5		0.0	0.0		0.0	-0.1		0.0	0.0		0.0	0.1	
Q2				-0.1	-0.7	-0.4	0.5	0.6		0.1	0.1		0.0	0.0		0.0	-0.1		0.0	0.0		0.0	0.0	
Q3				-0.1	-0.2	-0.1	0.4	0.5		-0.1	0.0		0.0	0.0		0.0	0.0		0.0	-0.1		0.0	0.0	
Q4				-0.1	-0.1	0.1	-0.1	-0.1	-0.5	0.0	-0.1		0.0	0.1		0.0	0.0		0.0	0.0		0.0	0.1	
1987 Q1							-0.1	-0.2	-0.4	0.3	0.1		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Q2							0.4	0.1	0.3	-0.2	0.0		0.0	0.1		0.0	0.0		0.0	0.0		0.0	0.0	
Q3							0.0	0.0	0.0	0.1	0.3		0.0	0.3		0.0	0.0		0.0	0.0		-0.1	-0.1	
Q4							0.2	0.0	0.1	0.1	0.3	0.2	0.0	0.1		0.0	0.0		0.0	0.1		0.1	0.1	
1988 Q1										0.0	0.1	0.1	0.1	-0.1		0.0	0.0		0.0	0.0		0.0	0.1	
Q2										0.2	-0.2	0.0	-0.1	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Q3										0.2	-0.3	-0.3	0.0	-0.3		0.0	0.1		0.0	0.1		0.0	0.1	
Q4										0.0	-0.1	-0.1	0.0	0.3	0.4	0.0	0.0		0.0	0.0		0.0	0.0	
1989 Q1													0.3	0.1	0.0	0.0	0.2		0.0	0.0		0.0	-0.1	
Q2													-0.1	0.0	0.1	-0.1	0.1		0.0	0.1		0.0	0.0	
Q3													0.1	0.3	0.1	0.1	0.1		0.0	0.1		0.0	-0.1	
Q4													0.1	0.3	0.0	-0.1	0.1	0.4	0.0	0.1		0.0	-0.1	
1990 Q1																0.3	0.0	0.1	-0.1	0.0		0.0	-0.1	
Q2																0.3	0.4	0.4	-0.1	0.1		0.0	-0.1	
Q3																0.0	0.2	0.2	0.1	0.3		-0.1	0.1	
Q4																0.0	0.1	0.0	0.2	0.1	0.0	0.0	0.0	
1991 Q1																			-0.1	0.1	-0.1	0.2	0.1	
Q2																			0.2	0.0	0.2	-0.1	-0.2	
Q3																			0.1	0.5	0.2	-0.1	-0.1	
Q4																			-0.1	0.7	-0.2	-0.2	-0.1	-0.1
1992 Q1																						0.2	-0.4	0.0
Q2																						0.2	0.1	0.7
Q3																						-0.1	-0.2	-0.3
Q4																						0.0	-0.1	-0.2

Note: These revisions do not include effects due to revisions in seasonal adjustment factors and/or changes in definitions.

Table 3 (cont.)

Page 2: Revisions to Previously Published Quarterly Growth Rates of the Monetary Aggregates (s.a.) Due to Revisions to Seasonal Adjustment Factors

Year of annual seasonal review (usually published in February, along with benchmark data revisions)

Periods	1986			1987			1988			1989			1990			1991			1992			1993		
	M1	M2	M3																					
1984 Q4	0.9	0.0	-0.3	-0.6	-0.3		0.1	0.0		0.0	0.2		0.7	0.1		-0.1	-0.1		-0.1	0.0		0.1	-0.1	
1985 Q1	-0.6	0.0	0.4	0.8	0.6		0.0	0.1		0.0	-0.1		-0.2	0.0		0.0	0.1		-0.3	0.0		0.3	0.0	
Q2	0.2	0.7	0.6	-0.3	-0.3		-0.1	0.2		0.0	-0.3		0.0	0.1		0.1	0.1		0.1	0.0		-0.2	0.0	
Q3	-0.6	-0.7	-0.6	-0.4	-0.2		0.1	-0.3		0.0	0.2		-0.2	-0.1		0.0	-0.1		0.2	0.0		-0.2	0.0	
Q4	1.1	0.1	-0.4	-0.3	-0.3	0.0	-0.1	-0.1		0.3	0.4		0.1	-0.1		-0.1	-0.1		0.0	0.0		0.1	0.0	
1986 Q1				1.0	1.0	0.1	0.1	0.2		-0.3	-0.3		-0.2	0.0		0.0	0.0		-0.3	-0.1		0.2	0.0	
Q2				-0.2	-0.4	0.1	-0.4	0.2		0.0	-0.4		0.4	0.3		0.1	0.2		0.0	0.0		-0.1	0.0	
Q3				-0.7	-0.3	-0.4	0.4	-0.3		-0.1	0.3		0.0	0.1		0.0	-0.1		0.2	0.0		-0.1	0.0	
Q4				-0.1	-0.2	0.1	-0.1	-0.2	-0.2	0.6	0.6		-0.5	-0.3		-0.2	0.0		0.1	0.0		0.1	0.0	
1987 Q1							0.1	0.3	0.4	-0.5	-0.4		-0.1	0.2		0.0	-0.1		-0.2	0.0		0.1	0.0	
Q2							-0.6	0.2	0.1	0.0	-0.5		0.7	0.4		0.3	0.2		-0.1	0.0		-0.1	0.0	
Q3							0.6	-0.2	-0.3	-0.3	0.3		0.1	-0.2		-0.2	-0.2		0.2	0.1		-0.1	0.0	
Q4							-0.2	-0.2	-0.2	1.0	0.7	0.7	-0.9	-0.5		-0.1	0.0		0.1	0.0		0.1	0.0	
1988 Q1										-0.6	-0.7	-0.3	-0.1	0.3		0.0	-0.1		-0.2	-0.1		0.0	0.0	
Q2										-0.1	-0.6	-0.5	1.1	0.5		0.4	0.3		-0.2	-0.1		0.0	0.0	
Q3										-0.2	0.5	0.1	0.1	-0.3		-0.3	-0.2		0.4	0.2		-0.1	0.1	
Q4										1.1	0.9	0.6	-1.3	-0.6	-0.6	-0.1	0.0		0.1	0.0		0.1	0.0	
1989 Q1													0.0	0.4	0.2	0.0	-0.1		-0.3	-0.1		-0.2	-0.1	
Q2													1.3	0.5	0.6	0.4	0.4		-0.3	-0.2		0.0	0.0	
Q3													0.2	-0.3	-0.1	-0.4	-0.3		0.5	0.3		0.1	0.2	
Q4													-1.6	-0.8	-0.6	-0.1	0.0	-0.5	0.0	0.0		0.0	0.0	
1990 Q1																0.1	-0.2	-0.1	-0.4	0.0		-0.4	-0.3	
Q2																0.4	0.5	-0.1	-0.3	-0.4		0.1	0.1	
Q3																-0.4	-0.3	-0.3	0.6	0.4		0.7	0.4	
Q4																-0.1	0.0	0.6	0.2	0.0	0.2	-0.3	-0.1	
1991 Q1																			-0.6	0.0	-0.6	-0.8	-0.4	
Q2																			-0.2	-0.4	-0.2	0.3	0.1	
Q3																			0.6	0.6	0.6	1.1	0.6	
Q4																			0.2	0.0	0.2	-0.4	-0.2	-0.3
1992 Q1																						-1.2	-0.5	-0.2
Q2																						0.6	0.1	0.3
Q3																						1.4	0.7	0.4
Q4																						-0.7	-0.5	-0.3

Note: These revisions shown do not include effects of benchmark data revisions to and/or changes in definition.

Table 3 (cont.)

Page 3: Revisions to Previously Published Quarterly Growth Rates of the Monetary Aggregates (s.a.) Due to Changes in Definition

Quarters	Year of redefinition (published at time of benchmark and seasonal review)																							
	1986			1987			1988			1989			1990			1991			1992			1993		
	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3
1984 Q4																								
1985 Q1																								
Q2																								
Q3																								
Q4																								
1986 Q1																								
Q2																								
Q3																								
Q4																								
1987 Q1																								
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1990 Q1																								
Q2																								
Q3																								
Q4																								
1991 Q1																								
Q2																								
Q3																								
Q4																								

Note: These revisions shown do not include effects due to benchmark data revisions and changes in seasonal adjustment factors.

Source: Data shown in shaded areas are taken from the issues of the Federal Reserve Board's *H.6* statistical release, published after the annual benchmark. See Kavajecz (1994) for exact dates. Other data shown are the authors' calculations from annual issues of *Money Stock Revisions*.

nual benchmark data.²⁰ Monthly seasonal factors are estimated by a variant of the Statistics Canada X11-ARIMA method.²¹ In the first step of this method, the observed data are extended by the addition of one or two years of forecasts. The forecasts are obtained via an ARIMA model that includes exogenous intervention variables for each month and, in some cases, a small number of special events.²² In recent years, intervention variables have been included for events such as the impact of the 1986 Tax Reform Act on the levels of liquid deposits in early 1987 and the dramatic surge in M1 that occurred during Hurricane Gloria's sweep up the east coast of the United States in September 1985. Seasonal factors are then obtained by applying standard X11 algorithms to the lengthened series.

Weekly seasonal factors are estimated via a two-step process. In the first, initial estimates of weekly seasonal factors are obtained from an unobserved-components time series model.²³ In the second, these initial estimates are modified via a quadratic programming model such that averages of a particular path of seasonally adjusted weekly data equal the previously estimated monthly seasonal pattern.²⁴ Projected weekly seasonal factors are obtained in a similar manner, subject to judgmental adjustment by Board staff for events such as unusual calendar dating and holiday effects that are not captured by the statistical models.

Like other aspects of the monetary aggregates, the methods used for seasonal adjustment have evolved over time. From 1955 — when the first seasonally adjusted numbers were published — through 1981, seasonal adjustment was done using the classic Census X11 procedure.²⁵ In 1982, the X11-ARIMA procedure proposed by Dagum was adopted to reduce well-known potential problems due to the use of truncated moving-

average filters near the ends of the sample.²⁶ Other features that have been added to improve the estimation include trading day effects, payment schedules and holiday dating.

Following recommendations of the Advisory Committee on Monetary Statistics, the Federal Reserve publishes both seasonally adjusted and unadjusted data. The weekly *H.6* release, for example, currently includes adjusted data for four monetary aggregates and 25 components, and unadjusted data for the four aggregates, 26 components and 11 related miscellaneous series. Most of the adjusted components are furnished for ease of analysis, however, and are not used in construction of the monetary aggregates. Seasonally adjusted M1 is constructed as the sum of four separately adjusted components: currency, travelers checks, demand deposits and other checkable deposits (OCDs). The non-M1 component of M2 and the non-M2 component of M3 are adjusted as a whole, with adjusted M2 equal to the sum of adjusted M1 and the non-M1 component of M2; M3 similarly is formed by summing M2 and the adjusted non-M2 component of M3.

Early each year, Board staff forecast seasonal adjustment factors for the monetary aggregates during the coming year. These projected factors are published on the *H.6* release at the same time as the benchmark data, and are not revised during the year on the basis of incoming data.²⁷ Hence, published monetary growth rates throughout the year are based on *ex ante* fixed seasonal factors that incorporate no information received during the current year. Thus, it perhaps is not surprising that revised seasonal factors for the most recently completed year may differ significantly from those that were forecast a year earlier. Revisions to the monetary aggregates due to revisions to seasonal fac-

²⁰The very few exceptions in which the seasonal review was completed and published after the benchmark are noted in Kavajecz (1994).

²¹See Farley and O'Brien (1987).

²²See Box and Tiao (1975).

²³The statistical model has been developed over a number of years; see Cleveland and Grupe (1983), Pierce, Grupe and Cleveland (1984), and Cleveland (1986). The model allows for a noninteger number of weeks during the year and other effects. Statistically, it seeks to estimate trend, seasonal and irregular components of a time series that is sampled at a frequency which differs from the fundamental frequencies of the data generating processes for its components.

²⁴See the appendix to Farley and O'Brien (1987) for details of the algorithm.

²⁵See Pierce and Cleveland (1981).

²⁶While X11 uses two-sided moving-average filters for most observations, the filters must be truncated near the ends of the time series. This effect tends to increase the size of the revisions to the most recent year's seasonal factors when they are reestimated the following year. Further, it also tends to underestimate the degree of seasonality near the end of the sample. Extending the sample via ARIMA model forecasts seems to attenuate both problems. See Dagum (1983).

²⁷Experimental estimates of concurrent seasonal factors, updated using incoming data, were published as an appendix to the *H.6* for several years but never incorporated into any official monetary aggregate. The Board's committee of experts on seasonal adjustment had recommended exploration of concurrent factors; see Pierce and Cleveland (1981). A similar recent review at the Bank of England (1992) suggested that concurrent adjustment might reduce the size of subsequent revisions.

tors, shown on the second page of Table 3, often have exceeded those due to either revisions to underlying source data (shown on the first page of the table) or to changes in definitions (the third page of Table 3).

Although the concept of seasonal movements in data may be fairly straightforward, there is no generally accepted statistical definition of seasonality. "True" seasonal factors are never observed nor measured, even with error. Thus, seasonally adjusted monetary aggregates necessarily retain a significant subjective component, even in the long run. Lindsey and others (1981) notes that the adjusted monetary aggregates have tended to become somewhat smoother through time as their seasonal adjustment factors have been subjected to successive annual revisions. Although he attributes this to increases in our knowledge about, and precision in, estimation of the seasonal adjustment factors, an alternative hypothesis is that the seasonal component is absorbing more of the irregular component, leaving an adjusted time series that more closely resembles its trend component.

Changes In Definitions

Although financial innovation has been an important factor, the evolution of the Federal Reserve Board staff's definitions of monetary aggregates primarily has been governed by economists' changing empirical perceptions of the appropriate concept of money.²⁸ In the 1960s, economists' focus on the medium of exchange function of money made M1 the principal aggregate. As empirical relationships for M1 appeared to break down in the 1970s and attention turned once again to the role of liquid near-moneys, some suggested that multiple monetary aggregates might collectively reveal more infor-

mation about the stance of monetary policy with respect to economic activity. The Federal Reserve responded by creating the monetary aggregates M2 and M3 in 1971, and M4 and M5 in 1975.

Despite the increasing attention focused on near-moneys, the multiple definitions of the monetary aggregates during the 1970s continued to reflect legislative distinctions between the asset and liability powers of banks and thrifts. These distinctions faded after passage of the Monetary Control and Garn-St. Germain Acts, permitting a new set of nested definitions such that M1 became a subset of M2, and M2 a subset of M3.²⁹ By internalizing within M2 opportunity-cost-induced shifts of funds between medium-of-exchange and liquid near-moneys for all intermediaries, this design enhanced the usefulness of M2 as an intermediate policy target through better estimates of a (nominally) stable demand curve for M2.³⁰

Since monetary aggregates data first appeared on the *J.3* statistical release in 1960, the broad monetary aggregates (roughly corresponding to M1, M2, M3) have been redefined about a dozen times. Changes have ranged in magnitude from the massive redefinition in February 1980 to small additions and subtractions such as the inclusion of nonbank travelers checks in June 1981. Whenever a definition change is put in place, Board staff recompute all historical data for the monetary aggregates and components under the most recent definitions.³¹ Available Federal Reserve publications, including *Money Stock Revisions*, show monetary aggregates data solely in terms of current definitions. For researchers studying Federal Reserve behavior, "knowing what money was" at a particular time is complicated by changes in definitions as well

²⁸Our view is that many of the theoretical arguments for the inclusion and/or exclusion of specific assets are *ex post* rationalizations of workable empirical definitions. The same argument is, of course, made by Friedman and Schwartz (1970).

²⁹There are a few qualifications to this characterization. From 1980-87, a portion of the vault cash and demand deposits held by thrifts had been included in M1 (but not in M2 and M3), while the balance was excluded (none of the vault cash and interbank deposits held by commercial banks were included in the aggregates). In 1988, the treatment of these items for thrifts was changed to be comparable to that for banks. Similarly, in constructing M3, a variety of netting items are deducted, such as large time deposits at commercial banks held by M2-type money market funds. In general, in moving from narrower to broader aggregates, any asset held by a money stock issuer (say, a money market fund) that was issued by another money stock

issuer (say, a commercial bank) is netted out of the broader consolidated monetary aggregate.

³⁰For discussion, see Simpson and Porter (1980).

³¹The 1980 redefinition, for example, required Board staff to "rebuild" M2 for years prior to 1980 with an expanded set of thrift deposit data. Some details are discussed in the appendix.

as by the annual benchmark and seasonal review process.

Definitional changes perhaps are usefully summarized in three categories. First, there is the inclusion (or, less often, exclusion) of an existing money market instrument or depository liability.³² A prominent example is the addition in 1980 of general purpose and broker/dealer MMMFs to the M2 aggregate.³³ While M2 was recomputed on a consistent basis for all prior periods following the redefinition, conceptually this is a nontrivial change. During the 1970s, when the first surge in money market fund growth occurred, the contemporaneous M2 aggregate excluded money market funds; shifts by households into the funds were (in principal) embedded in the elasticity of M2 with respect to its opportunity cost and reflected in shifts in the income velocity of M2. Researchers using the redefined M2, however, see an aggregate that internalizes these shifts, has a smaller interest elasticity, and different velocity behavior. Of course, the importance of this change in definition for analysis of Fed behavior is mitigated by the FOMC's emphasis on M1 during the period. Other examples are the inclusion in M2 of retail RPs (which were basically uninsured small time deposits exempt from Reg Q) in 1982, the exclusion of retirement accounts from the monetary aggregates in 1983, and the addition of term Eurodollar deposits to M3 in 1984. While the last had been discussed earlier, inclusion of the deposits had to await a reliable source of data.

The second type of definition change is the inclusion of a new money market instrument or depository institution liability. In some cases, the new instrument or deposit may simply reflect the removal of a prohibition against that type of deposit or of a ceiling on a deposit offering rate (Regulation Q ceilings). To the ex-

tent that deregulation or the authorization of new instruments permanently changes the behavior of depositories, its effect on the monetary aggregates is similar to a change in definition. Examples include the authorization of NOW accounts nationwide in 1980, the introduction of money market deposit accounts (MMDAs) in 1983, and the major discrete steps in the phaseout of Regulation Q that occurred in 1982, 1983 and 1986.³⁴ In many cases, this type of deposit account was *already* included in the aggregates (both OCDs and MMDAs are types of savings deposits). The authorization of these new instruments, largely born of deposit interest rate controls, likely induced unusual transitory volatility in published data during the period when money may be shifting between components and may also have permanently changed the income and interest elasticities of the monetary aggregate.³⁵

The third type of definition change is reclassification of the liabilities of different types of financial institutions. Prior to the 1980 redefinition, deposits at banks and thrift were included in separate monetary aggregates. Deposits at thrifts were included in M3 and M5 while comparable deposits at banks were included in M2 and M4. The 1980 redefinition restructured the monetary aggregates to combine similar types of deposits at commercial banks and thrifts. Although strongly motivated by the increasing similarity of the deposits offered by banks and thrifts during the 1970s, some economists counselled against the pooling of bank and thrift liabilities in the new aggregates. Their arguments were based largely on the joint product nature of depositories. To the extent that firms and households tend to purchase a bundle of services from a single institution rather than separate products from a number of institutions, there may be value to aggregation by institution-

³²The precise definition of M1 has changed several times due to changes in the treatment of demand deposits due to foreign commercial banks and official institutions. Included in M1 prior to 1980 (see Kavajecz, 1994), these deposits were excluded thereafter following recommendations of the Advisory Committee on Monetary Statistics. See Advisory Committee on Monetary Statistics (1976), p. 4, or Farr and others (1978). These changes also complicate building M1 based on current definitions for years prior to 1959; see Rasche (1987).

³³Tax-exempt general purpose and broker/dealer MMMFs, excluded in 1980, were added in February 1983.

³⁴See Kavajecz (1994) for details. More obscure examples include certain assets sold by depositories with recourse, bank investment contracts (BICs), and bank deposit notes (the latter classified as a deposit under Federal Reserve Regulation D but not by the FDIC). Brokered deposits pro-

vide another example. Although a bank or thrift might receive a deposit of a million dollars (or more) from a broker, the amount of the deposit is included in M2 as a small time deposit if the deposit is placed entirely for the benefit of individuals. In this manner, the development of the brokered retail CD market could potentially have affected the apparent interest elasticity of M2 by altering the behavior of its small time deposit component.

³⁵There is no doubt this was the case in 1983, when the FOMC decided to rebase its target growth rate ranges for the year following the introduction of MMDAs. The implications of deregulation during the 1980s, including the demise of Reg Q, for money demand models are discussed by Moore, Porter and Small (1990).

al type rather than by product. In response, the Board adopted the recommendation that, to every extent feasible, data for banks and thrifts should be published separately so as to permit such analysis. This argument is similar to Friedman and Schwartz's position that financial assets may appropriately be aggregated if they are sufficiently close substitutes in either demand or supply.

Overall, annual revisions to the monetary aggregates due to revisions to source data, seasonal factors and definitions render treacherous any attempt by a researcher to update or extend previous studies by mixing differing vintages of monetary aggregates data. One recent empirical study (Dewald, Thursby and Anderson, 1986) found in an extensive computer simulation experiment that empirical results may be highly sensitive to the mixing of different vintages of data, including data on the monetary aggregates. A complete chronology of revisions and redefinitions of the monetary aggregates is shown in Kavajecz (1994).

CONCLUSION: THE MONETARY AGGREGATES AS MONETARY TARGETS

We conclude our historical examination of the Federal Reserve's monetary aggregates with a summary of their use as monetary policy targets. The FOMC's target and monitoring ranges for the aggregates are shown in Table 4.³⁶

Targeting of monetary aggregates began with House Concurrent Resolution 133 in 1975, later formalized in the Humphrey-Hawkins Act of 1978 as an amendment to the Federal Reserve Act. From 1975 through 1978, the committee re-based each quarter its annual four-quarter target range for the monetary aggregates. The resulting base drift in the committee's targets

has been controversial.³⁷ Since 1978, the committee has set one, fourth-quarter-to-fourth-quarter range each year except 1983. Authorization of MMDAs in late 1982 led to a surge in M2 growth as aggressive bidding by depositories against money market funds apparently drew nonmonetary balances into M2. (Recall that taxable general purpose and broker/dealer MMMFs had been included in M2 in 1980 and that MMDAs, a type of savings deposit, were always included in M2. M2 was redefined slightly in February 1983 to include tax-exempt general purpose and broker/dealer money market funds.) The committee subsequently reset its 1983 target ranges using a February-March base.

While relatively narrow through the early 1980s, target ranges widened during the decade as an accelerating pace of innovation in financial markets apparently complicated money demand forecasting and money stock control. The range for M1 was widened to 4 percentage points in 1983 and to 5 points in 1985. Citing uncertainty regarding the demand for M1 and its relationship to economic activity, the committee did not set a target range for M1 in 1987 or beyond.³⁸

The target range for M2 similarly was widened over this interval, although it has remained at its current width of 4 percentage points since 1988. In part, the widening of the range in 1988 reflects the increased difficulty of forecasting the demand for M2 during an era of turmoil in financial markets, including the restructuring of the thrift industry, capital and earnings difficulties at commercial banks, and a restructuring (deleveraging) of household and firm balance sheets.

The monetary aggregates during most years have grown within their target ranges, as shown in Figures 1 and 2. Growth often has run well toward the upper or lower bounds of the cones, however, suggesting that the midpoint of the committee's target range may not always be the best forecast of an aggregate's growth.

³⁶Target and monitoring ranges differ in terms of the strength of the implied policy reaction function. In general, deviation of an aggregate from a target range suggests a somewhat stronger policy response than deviation from a monitoring range, *ceteris paribus*.

³⁷For contrasting views, see for example Axilrod (1982), Broaddus and Goodfriend (1984) and Walsh (1986).

³⁸"Monetary Policy Report to the Congress," *Federal Reserve Bulletin*, April 1987.

Table 4
Growth Cones for the Monetary and Credit Aggregates
(percent annual rate)

Date established	Base period	Span	Target and monitoring ranges			Bank credit proxy
			M1	M2	M3	
Apr.75	Mar.75	Mar.75-Mar.76	5.0 - 7.5	8.5 - 10.5	10.0 - 12.0	6.5 - 9.5
Jun.75	Jun.75	Jun.75-Jun.76	5.0 - 7.5	8.5 - 10.5	10.0 - 12.0	6.5 - 9.5
Jul.75	75Q2	75Q2 - 76Q2	5.0 - 7.5	8.5 - 10.5	10.0 - 12.0	6.5 - 9.5
Oct.75	75Q3	75Q3 - 76Q3	5.0 - 7.5	7.5 - 10.5	9.0 - 12.0	6.0 - 9.0
Jan.76	75Q4	75Q4 - 76Q4	4.5 - 7.5	7.5 - 10.5	9.0 - 12.0	6.0 - 9.0
Apr.76	76Q1	76Q1 - 77Q1	4.5 - 7.0	7.5 - 10.0	9.0 - 12.0	6.0 - 9.0
Jul.76	76Q2	76Q2 - 77Q2	4.5 - 7.0	7.5 - 9.5	9.0 - 11.0	5.0 - 8.0
Nov.76	76Q3	76Q3 - 77Q3	4.5 - 6.5	7.5 - 10.0	9.0 - 11.5	5.0 - 8.0
Jan.77	76Q4	76Q4 - 77Q4	4.5 - 6.5	7.0 - 10.0	8.5 - 11.5	7.0 - 10.0
Apr.77	77Q1	77Q1 - 78Q1	4.5 - 6.5	7.0 - 9.5	8.5 - 11.0	7.0 - 10.0
						Bank credit
Jul.77	77Q2	77Q2 - 78Q2	4.0 - 6.5	7.0 - 9.5	8.5 - 11.0	7.0 - 10.0
Oct.77	77Q3	77Q3 - 78Q3	4.0 - 6.5	6.5 - 9.0	8.0 - 10.5	7.0 - 10.0
Feb.78	77Q4	77Q4 - 78Q4	4.0 - 6.5	6.5 - 9.0	7.5 - 10.0	7.0 - 10.0
Apr.78	78Q1	78Q1 - 79Q1	4.0 - 6.5	6.5 - 9.0	7.5 - 10.0	7.5 - 10.5
Jul.78	78Q2	78Q2 - 79Q2	4.0 - 6.5	6.5 - 9.0	7.5 - 10.0	8.5 - 11.5
Oct.78	78Q3	78Q3 - 79Q3	2.0 - 6.0	6.5 - 9.0	7.5 - 10.0	8.5 - 11.5
Feb.79	78Q4	78Q4 - 79Q4	1.5 - 4.5	5.0 - 8.0	6.0 - 9.0	7.5 - 10.5
Feb.80	79Q4	79Q4 - 80Q4	4.0 - 6.5(M1B)	6.0 - 9.0	6.5 - 9.5	6.0 - 9.0
Feb.81	80Q4	80Q4 - 81Q4	3.5 - 6.0(M1B)	6.0 - 9.0	6.5 - 9.5	6.0 - 9.0
Feb.82	81Q4	81Q4 - 82Q4	2.5 - 5.5	6.0 - 9.0	6.5 - 9.5	6.0 - 9.0
						Debt
Feb.83	83Feb/Mar	83Feb/Mar-83Q4	—	7.0 - 10.0	—	—
Feb.83	82Q4	82Q4 - 83Q4	4.0 - 8.0	—	6.5 - 9.5	8.5 - 11.5
Jul.83	83Q2	83Q2 - 83Q4	5.0 - 9.0	NC	NC	NC
Jan.84	83Q4	83Q4 - 84Q4	4.0 - 8.0	6.0 - 9.0	6.0 - 9.0	8.0 - 11.0
Feb.85	84Q4	84Q4 - 85Q4	4.0 - 7.0	6.0 - 9.0	6.0 - 9.5	9.0 - 12.0
Jul.85	85Q2	85Q2 - 85Q4	3.0 - 8.0	NC	NC	NC
Feb.86	85Q4	85Q4 - 86Q4	3.0 - 8.0	6.0 - 9.0	6.0 - 9.0	8.0 - 11.0
Feb.87	86Q4	86Q4 - 87Q4	NS	5.5 - 8.5	5.5 - 8.5	8.0 - 11.0
Feb.88	87Q4	87Q4 - 88Q4	NS	4.0 - 8.0	4.0 - 8.0	7.0 - 11.0
Feb.89	88Q4	88Q4 - 89Q4	NS	3.0 - 7.0	3.5 - 7.5	6.5 - 10.5
Feb.90	89Q4	89Q4 - 90Q4	NS	3.0 - 7.0	2.5 - 6.5	5.0 - 9.0
Jul.90	89Q4	89Q4 - 90Q4	NS	NC	1.0 - 5.0	NC
Feb.91	90Q4	90Q4 - 91Q4	NS	2.5 - 6.5	1.0 - 5.0	4.5 - 8.5
Feb.92	91Q4	91Q4 - 92Q4	NS	2.5 - 6.5	1.0 - 5.0	4.5 - 8.5
Feb.93	92Q4	92Q4 - 93Q4	NS	2.0 - 6.0	0.5 - 4.5	4.5 - 8.5
Jul.93	92Q4	92Q4 - 93Q4	NS	1.0 - 5.0	0.0 - 4.0	4.0 - 8.0

The FOMC first set desired longer-run growth targets for M1, M2, M3 and the bank credit proxy at its meeting on April 14-15, 1975. On February 15, 1977, ranges for the monetary aggregates were added to the Domestic Policy Directive sent to the Open Market Desk at the Federal Reserve Bank of New York. On April 18, 1978, the range for bank credit was added to the Domestic Policy Directive.

NC: Not Changed
 NS: None Specified

Figure 1
M2 Historical Target Ranges

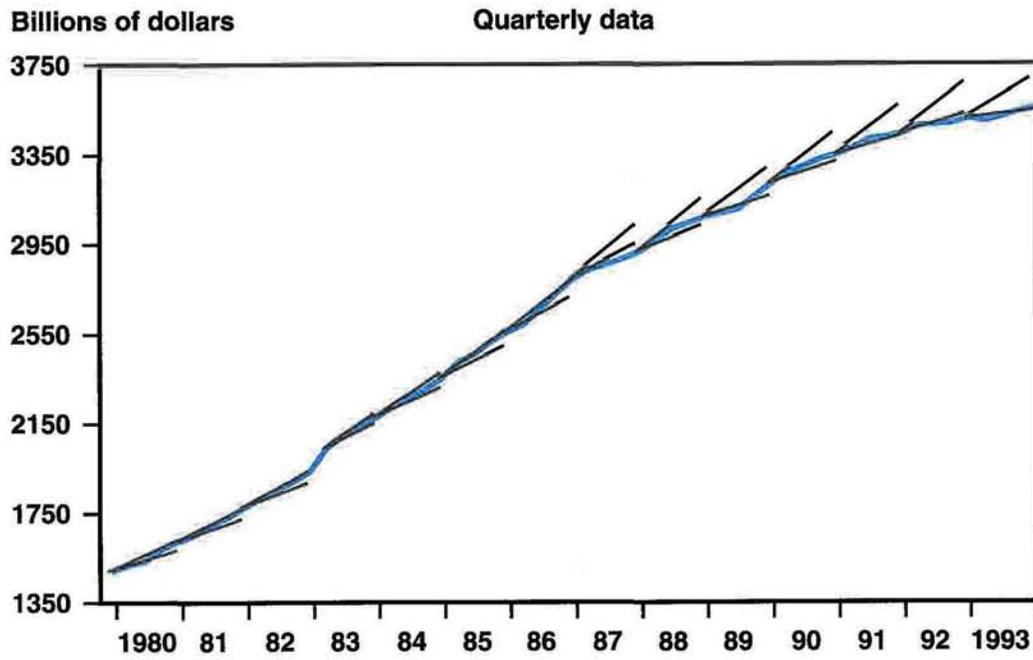
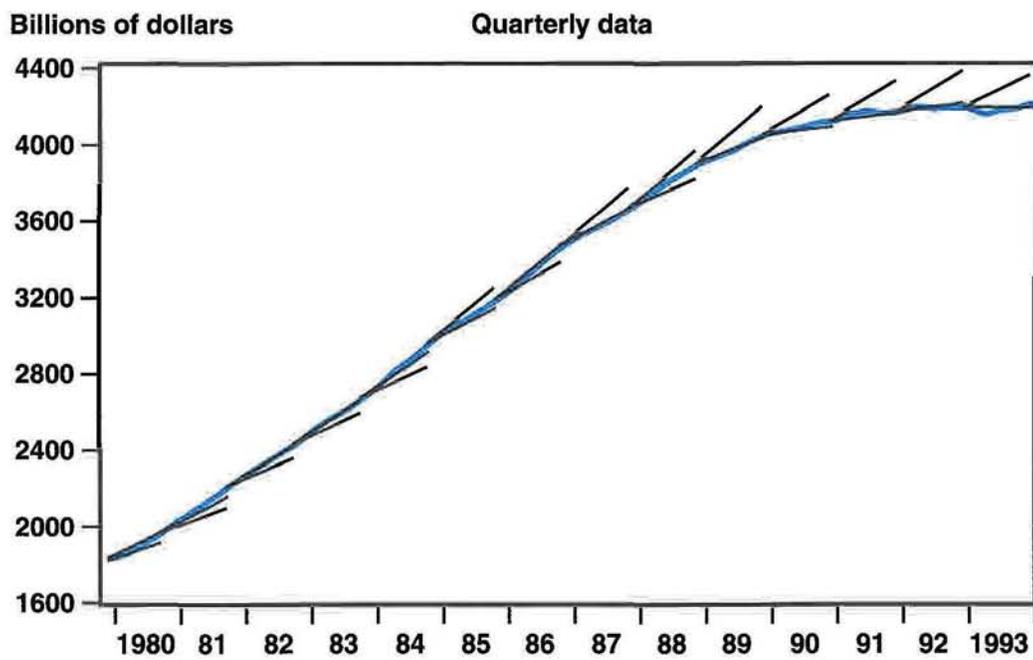


Figure 2
M3 Historical Target Ranges



REFERENCES

- Abbott, William J. "Revision of Money Supply Series," *Federal Reserve Bulletin* (August 1962), pp. 941-51.
- _____. "A New Measure of the Money Supply," *Federal Reserve Bulletin* (October 1960), pp. 1102-23.
- Advisory Committee on Monetary Statistics. *Improving the Monetary Aggregates: Report of the Advisory Committee on Monetary Statistics*. Board of Governors of the Federal Reserve System, 1976.
- Axilrod, Stephen. "Comments in 'Is the Federal Reserve's Monetary Control Policy Misdirected? Resolved: That the Federal Reserve's Current Operating Procedures for Controlling Money Should be Replaced,'" *Journal of Money, Credit and Banking* (February 1982), pp. 119-47.
- Bank of England. *Report of the Seasonal Adjustment Working Party*, Occasional Paper no. 2 (October 1992).
- Barnett, William A. "Economic Monetary Aggregates: An Application of Index Number and Aggregation Theory," *Journal of Econometrics, Annals of Applied Econometrics 1980-3, a supplement* (1980), pp. 11-48.
- Beck, Darwin L. "Sources of Data and Methods of Construction of the Monetary Aggregates," in *Improving the Monetary Aggregates: Staff Papers*. Board of Governors of the Federal Reserve System, 1978, pp. 117-33.
- Board of Governors of the Federal Reserve System. *All-Bank Statistics 1896-1955*. Board of Governors of the Federal Reserve System, 1959.
- _____. *Annual Report*.
- _____. *Annual Statistical Digest*.
- _____. *Banking and Monetary Statistics 1941-1970*. Board of Governors of the Federal Reserve System, 1976.
- _____. *Banking and Monetary Statistics*. Board of Governors of the Federal Reserve System, 1943.
- _____. *Demand Deposits, Currency, and Related Items (J.3)*.
- _____. *Federal Reserve Bulletin*.
- _____. *Money Stock, Liquid Assets, and Debt Measures (H.6)*.
- _____. *Money Stock Revisions*, annual supplement to the H.6.
- Box, G.E.P., and G.C. Tiao. "Intervention Analysis With Applications to Economic and Environmental Problems," *Journal of American Statistical Association* (March 1975), pp. 70-9.
- Broadbudd, Alfred. "Aggregating the Monetary Aggregates: Concepts and Issues," *Federal Reserve Bank of Richmond Economic Review* (November/December 1975), pp. 3-12.
- _____, and Marvin Goodfriend. "Base Drift and the Longer Run Growth of M1: Experience from a Decade of Monetary Targeting," *Federal Reserve Bank of Richmond Economic Review* (November/December 1984), pp. 3-14.
- Cleveland, William P. "Calendar Adjustment and Time Series," Board of Governors of the Federal Reserve System Special Studies Paper, Division of Research and Statistics, no. 198 (October 1986).
- _____, and Michael R. Grupe. "Modeling Time Series When Calendar Effects Are Present," in Arnold Zellner, ed., *Conference on Applied Time Series Analysis of Economics Data*. U.S. Department of Commerce, 1983, pp. 57-67.
- Collins, Sean, and Cheryl L. Edwards. "Redefining M2 to Include Bond and Equity Mutual Funds," mimeo. Board of Governors of the Federal Reserve System, 1994.
- Copeland, Morris A., and Daniel H. Brill. "Banking Assets and the Money Supply Since 1929," *Federal Reserve Bulletin* (January 1948), pp. 24-32.
- Dagum, Estella Bell. *The X-11-ARIMA Seasonal Adjustment Method*. Statistics Canada, 1983.
- Dewald, William G., Jerry G. Thursby, and Richard G. Anderson. "Replication in Empirical Economics: The Journal of Money, Credit and Banking Project," *The American Economic Review* (September 1986), pp. 587-603.
- Duprey, James N. "How the Fed Defines and Measures Money," *Federal Reserve Bank of Minneapolis Quarterly Review* (Spring-Summer 1982), pp. 10-9.
- Farley, Dennis E., and Yueh-Yun C. O'Brien. "Seasonal Adjustment of the Money Stock in the United States," *Journal of Official Statistics* (1987, vol. 3, no. 3), pp. 223-33.
- Farr, Helen T., Lance Girton, Henry S. Terrell, and Thomas H. Turner. "Foreign Demand Deposits at Commercial Banks in the United States," in *Improving Monetary Aggregates: Staff Papers*. Board of Governors of the Federal Reserve System, 1978, pp. 35-54.
- Friedman, Milton, and Anna J. Schwartz. *Monetary Statistics of the United States*. Columbia University Press, 1970.
- Fry, Edward R., Darwin Beck, and Mary F. Weaver. "Revision of the Money Stock," *Federal Reserve Bulletin* (December 1970), pp. 887-909.
- Gilbert, R. Alton. "Requiem for Regulation Q: What it Did and Why It Passed Away," this *Review* (February 1986), pp. 22-37.
- Hallman, Jeffrey J., Richard D. Porter, and David H. Small. "Is the Price Level Tied to the M2 Monetary Aggregate in the Long Run?" *The American Economic Review* (September 1991), pp. 841-58.
- Kavajecz, Kenneth A. "The Evolution of the Federal Reserve's Monetary Aggregates: A Timeline," this *Review* (March/April 1994).
- Laidler, David W. *The Demand for Money: Theories, Evidence, and Problems*, 4th edition. Harper and Row, 1993.
- Lang, Richard W. "Benchmark Revisions of the Money Stock and Ranges of Money Stock Growth," this *Review* (June 1978), pp. 11-9.
- Lawler, Thomas A. "Seasonal Adjustment of the Money Stock: Problems and Policy Implications," *Federal Reserve Bank of Richmond Economic Review* (November/December 1977), pp. 19-27.
- Lindsey, David, and others. "Monetary Control Experience Under the New Operating Procedures," in *New Monetary Control Procedures*. Board of Governors of the Federal Reserve System, 1981.
- Moore, George R., Richard D. Porter, and David H. Small. "Modeling the Disaggregated Demands for M2 and M1: The U.S. Experience in the 1980s," in Peter Hooper and others, eds., *Financial Sectors in Open Economies: Empirical Analysis and Policy Issues*. Board of Governors of the Federal Reserve System, 1990, pp. 21-105.
- National Credit Union Association. *Annual Report*.
- Orphanides, Athanasios, Brian Reid, and David Small. "The Empirical Properties of a Monetary Aggregate That Adds Bond and Equity Mutual Funds to M2," Board of Governors of the Federal Reserve System Financial and Economics Discussion Paper no. 93-42, Division of Monetary Affairs (December 1993).
- Pierce, David A., and William P. Cleveland. "Seasonal Adjustment Methods for the Monetary Aggregates," *Federal Reserve Bulletin* (December 1981), pp. 875-87.

- _____, Michael R. Grupe, and William P. Cleveland. "Seasonal Adjustment of the Weekly Monetary Aggregates: A Model-Based Approach," *Journal of Business and Economic Statistics* (July 1984), pp. 260-70.
- Rasche, Robert H. "Demand Functions for Measures of U.S. Money and Debt," in Peter Hooper and others, eds., *Financial Sectors in Open Economies: Empirical Analysis and Policy Issues*. Board of Governors of the Federal Reserve System, 1990, pp. 113-61.
- _____. "M1-Velocity and Money-Demand Functions: Do Stable Relationships Exist?" *Carnegie-Rochester Conference Series on Public Policy* (autumn 1987), pp. 9-88.
- Simpson, Thomas D. "The Redefined Monetary Aggregates," *Federal Reserve Bulletin* (February 1980), pp. 97-114.
- _____. "A Proposal for Redefining the Monetary Aggregates," *Federal Reserve Bulletin* (January 1979), pp. 13-33.
- _____, and Richard Porter. "Some Issues Involving the Definition and Interpretation of the Monetary Aggregates," *Controlling Monetary Aggregates III*, Federal Reserve Bank of Boston Conference Series no. 23 (October 1980), pp. 161-234.
- _____, and John R. Williams. "Recent Revisions in the Money Stock: Benchmark, Seasonal Adjustment, and Calculation of Shift-Adjusted M1-B," *Federal Reserve Bulletin* (July 1981), pp. 539-42.
- Spindt, Paul A. "Money Is What Money Does: Monetary Aggregation and the Equation of Exchange," *Journal of Political Economy* (1985), pp. 175-204.
- Van Peski, Neva. "Appendix: Data Sources and Construction of the Proposed Monetary Aggregates," *Federal Reserve Bulletin* (January 1979), pp. 33-42.
- Walsh, Carl. "In Defense of Base Drift," *The American Economic Review* (September 1986), pp. 692-700.
- Walter, John R. "Monetary Aggregates: A User's Guide," Federal Reserve Bank of Richmond *Economic Review* (January/February 1989), pp. 20-8.
- Walton, Jack, and others. "Performance Evaluation of Money Stock, Liquid Assets, and Debt Measures (H.6) Statistical Release," unpublished memorandum. Board of Governors of the Federal Reserve System, Division of Monetary Affairs, 1991.

Appendix

Building Historical Monetary Aggregates 1959-80

The 1980 redefinition of the monetary aggregates confronted Board staff with the daunting task of building comparable historical data. In some cases, large amounts of additional data needed to be collected. In others, various estimates and approximations had to be made since required historical data had not been collected in the needed detail, at the desired frequency, or on the basis of consistent definitions. Although the data sources available as of 1977 have been described elsewhere, little has been written about the earlier data.¹ This appendix, based on published and unpublished material, summarizes available information about the data sources and methods used to construct monetary aggregates for years prior to 1980.

Monetary aggregates are built by consolidation of data, not addition. Consolidation requires not only data on the types and amounts of outstanding liabilities of financial intermediaries but also data on the ownership of such liabilities by other money-stock-issuing institutions, the latter being netted from the aggregate during consolidation. So far as possible, the discussion below reviews available data on both items.

DEPOSITS INCLUDED IN M1

Most commercial bank deposit items were available at least twice a year from call reports. Demand deposits had been reported by member banks since well before 1959. Call report data were available quarterly from all banks beginning in 1961, when quarterly call reports became required by law.

Daily data on OCD accounts were available for member banks. End-of-month data beginning in September 1972 for other New England financial institutions were obtained from the Federal Reserve Bank of Boston.

MSBs issued two types of demand deposits. One was used for regular third-party payments,

that is, it was checkable. The other consisted mainly of escrow balances, not used for regular payments. Only the first is included in the monetary aggregates. Separation of the two types of deposits prior to 1980 was based on month-end data collected by the FDIC during an 18-month survey conducted from July 1975 to December 1976. The survey data themselves were included in M1 for the 18 months they were available. Before and after this period, data on total demand deposits reported on semi-annual or quarterly call reports were multiplied by the average ratio of checkable to total demand deposits during the survey period. Monthly data were obtained by interpolation.

Share draft balances at federal credit unions were obtained from the National Credit Union Administration (NCUA) as of month-end for May-September 1976. Thereafter, only end-of-quarter data were available. No data were available on share drafts at state credit unions. For total credit union savings deposits, as of July 1977, federal credit unions held 55 percent of savings deposits; their share of share draft accounts is unknown.

Under the 1980 definition of the monetary aggregates, demand deposits at commercial banks due to thrifts, foreign banks and foreign official institutions are subtracted from total demand deposits in building M1 (see Table 2). Demand deposits at U.S. commercial banks due to foreign commercial banks and official institutions were available weekly (on Wednesday) for weekly reporting banks since May 1961, and quarterly or twice a year from call reports for all banks since (at least) 1959.² M1-type deposits at foreign-related institutions were available as of the last Wednesday of the month since November 1972 (beginning in 1977, Edge Act corporations reported only quarterly, but other institutions continue to report monthly). For earlier years, estimates were based on data

¹Beck (1978) describes data available in 1977 and refers to unpublished memoranda for earlier sources and methods. Our discussion here draws from unpublished Federal Reserve Board memoranda by Neva Van Peski and Darwin Beck, and from Van Peski (1979). We thank them for helpful comments while absolving them of responsibility for remaining errors or omissions.

²The report form filed by weekly reporting banks had been revised in 1961 and 1966 to improve coverage of these

items; see the introduction to chapter 4 in *Banking and Monetary Statistics 1941-1970*. Ironically, these data were originally collected from weekly reporting banks so that they could be added back into the monetary aggregates after being removed during earlier adjustments. Following the 1980 redefinitions, these reported data were used to remove the same items from the new aggregates.

taken from the Annual Report of the Superintendent of Banks in New York and for Edge Act corporations from call reports submitted twice a year to the Federal Reserve Bank of New York.

Deposits due to thrifts were handled in various ways. For MSBs, demand deposits at weekly reporting (commercial) banks (FR2416 reporters) due to MSBs were available for each Wednesday since May 1961. Quarterly or semiannual data for all commercial banks also were available on call reports since before 1959. These deposits were netted out of M1. For credit unions, demand deposits at all commercial banks due to credit unions were estimated to equal 0.03 percent of total year-end credit union assets for each year through 1974. After 1974, they were taken to equal the "cash" item in the annual reports of the NCUA. (No adjustment was made for credit union vault cash, also included in this item.) For savings and loan associations (S&Ls), demand deposits at commercial banks before 1973 were assumed to be a constant fraction of the item "cash on hand and in banks" reported annually in condition statements issued by the Federal Home Loan Bank Board (FHLBB); we do not know the value of the fraction used. Beginning September 1973, semiannual call reports are available in March and September from the FHLBB.

DEPOSITS INCLUDED IN THE NON-M1 COMPONENT OF M2

Savings Deposits

The savings deposit component of M2 includes deposits at commercial banks, MSBs, S&Ls and credit unions. As usual, construction of monetary aggregates requires both gross deposit amounts and, as a netting item, the amounts of deposits held by other money stock issuers. Monthly savings deposit data generally were

available beginning in 1968. For prior years, savings deposits often were estimated as a constant share of total deposits, the share itself being estimated from data available circa 1968. The following paragraphs discuss estimates for each type of depositary.

For commercial banks from June 1961 through June 1966, total savings deposits were taken from semiannual and quarterly call reports; monthly values were obtained by interpolation. For July 1966 through January 1968, savings deposits at member banks were estimated from monthly summary reports submitted by the Federal Reserve Banks (FR422). Beginning January 1968, member banks reported daily savings deposits each week. Monthly nonmember bank data were obtained by interpolation of quarterly call reports.³ The number of data items required as netting items in consolidation is small since commercial banks were not permitted to offer savings accounts to profit-making businesses (including other depositories) prior to November 1975. Thereafter, data regarding savings deposits due to domestic and foreign banks and foreign official institutions were available on Wednesdays for weekly reporting banks and for all banks on quarterly call reports since March 1976. (Note that this corresponds to current practices shown in Table 2.)

We have been unable to clarify precisely which data were used from 1959-67 for MSBs. From 1959-67, total deposits were available on a month-end basis from the National Association of Mutual Savings Banks (NAMSB), but no separate savings deposit series was available. For 1968-71, savings deposits were estimated using total deposit data and a deposit breakdown collected in a quarterly survey by the FDIC.⁴ Beginning in December 1971, month-end savings deposits were published by the NAMSB. Month-average data (to correspond to averages of daily data, so far as possible) were constructed by averaging month-end data.

³The discussion in this appendix is somewhat more precise than what we have been able to document. From July 1966 through January 1968, for example, Board staff wrote that "nonmember bank data were estimated using ratios generated from call report data..." but they do not say precisely how this was done or which ratios were used. The staff memos do note that nonmember bank data continued to be taken from call reports after January 1968, and that monthly values were obtained by interpolation of quarterly call report data.

⁴Unfortunately, we have been unable to locate a description of the estimation procedure.

Two netting items were needed for MSBs: savings deposits at MSBs due to the U.S. Treasury, and savings deposits held by MSBs at commercial banks. Both series were available on call reports beginning in March 1976. Different approximations were used to generate data for prior dates. U.S. Treasury deposits were in fact zero for all months prior to November 1974, the first month MSBs were permitted to offer interest-bearing savings deposits to governments. Government deposits were assumed to be \$1 million in November 1974 and all intermediate months were obtained by linear interpolation. Similarly, savings accounts held by MSBs at commercial banks were assumed to be \$1 million in November 1975 and intermediate months through March 1976 were obtained by interpolation.

For S&Ls, total deposits for all operating S&Ls from 1959 to June 1968 were obtained from the Federal Savings and Loan Insurance Corporation (FSLIC).⁵ Beginning in July 1968, month-end savings deposits at all federally-insured S&Ls became available from the FSLIC. For the earlier period (1959 to June 1968), savings deposits were assumed to equal total deposits multiplied by the July 1968 ratio of savings to total deposits. Month-average data were obtained by averaging month-end data.

Savings deposits held by S&Ls at other depositories, netted out in consolidating M2, were available semiannually beginning in September 1973 from the March-September reporting system release published by the FHLBB (essentially a semiannual call report). Values for prior months were obtained by linear interpolation between an assumed zero in December 1967 and the September 1973 value of \$19 million.

Credit union shares were obtained on a month-end basis from NCUA.⁶ Month-average data are constructed by averaging month-end data. Deposits of credit unions at other credit

unions, netted out in consolidation, are available annually for federal credit unions from the year-end report of the NCUA beginning in December 1968; values for prior years are assumed to be zero.⁷ Similar data for state credit unions were estimated by multiplying total assets at state-chartered credit unions by the ratio of such inter-credit-union shares to total assets at federal credit unions.

Small Time Deposits

The small time deposit component of M2 includes bank and thrift deposits under \$100,000 with an original maturity of seven days or more. U.S. Treasury deposits and deposits of thrifts with commercial banks and other thrifts are netted out in consolidation.

For commercial banks, small time deposits were computed as a residual by subtracting two series, savings deposits and time deposits of more than \$100,000, from reported data on total time and savings deposits. Total time and savings deposits at member banks had been reported weekly since 1959. Small time deposits at non-member banks were estimated by multiplying small time deposits at small member banks by the ratio of small time deposits at nonmember banks to small time deposits at small member banks on call report dates.⁸

Time deposits due to the U.S. Treasury and due to MSBs were netted from the non-M1 component of M2 in consolidation. For weekly reporting member banks, these data were available on Wednesday since 1959 and 1961, respectively (however, see *Banking and Monetary Statistics 1941-1970*, chapter 4, for a discussion of changes in items reported). For other banks, semiannual and quarterly call report data were available since before 1959.

For MSBs, month-end time deposits beginning in December 1971 were obtained from NAMS. For prior periods, time deposits were estimated

⁵Conversations with former FHLBB staff during the course of this research suggest that these data never, in fact, covered all operating S&Ls. Some data for non-FSLIC institutions were apparently estimated rather than obtained directly. Other sources report that federally insured S&Ls likely held as much as 95 percent or more of total S&L deposits. Recall that state-insured thrifts in Massachusetts and New York were chartered as MSBs.

⁶It isn't clear whether these data covered all credit unions or only federally insured institutions. Our guess is the latter. If so, other credit union deposits would be excluded from the aggregates, perhaps one-half of total credit union deposits.

⁷Smaller credit unions often hold, as a significant part of their assets, shares in large "corporate central" credit unions. Although the latter have some retail business, they primarily act as an investor of excess funds deposited with them by other credit unions.

⁸As in some other cases, this is a somewhat more specific statement of what we believe was done than we have, in fact, been able to locate.

by Board staff from data on total deposits at MSBs (available at least from 1959) and from time deposit data collected on quarterly FDIC surveys (available at least since 1966). We have no description of what was done for 1959-65, but it is likely that the 1966 ratio of time deposits to total deposits was simply maintained over this period. (Precisely what was done may be of little importance, since time deposits at MSBs were only 1 percent of total deposits in 1966.)

Time deposits of S&Ls at banks are netted from M2 in consolidation. Beginning in September 1973, time deposits of S&Ls at commercial banks were taken from a semiannual FHLBB publication, referred to in unpublished Board memoranda as the FHLBB March-September reporting system. For all dates prior to September 1973, it was assumed that S&Ls kept the same proportion of their cash assets in bank time deposits as they had in September 1973. In other words, S&L time deposits at banks from 1959-72 were assumed to be a constant fraction of the amount of "cash on hand and in banks" reported by S&Ls in annual condition statements to the FHLBB. The value of that fraction was the ratio of bank time deposits to cash assets shown in the September 1973 report in the FHLBB March-September reporting system.

Time deposits of credit unions at banks and S&Ls also are netted from M2. Deposits of credit unions at S&Ls (assumed to be time

deposits) were reported at year-end by federal credit unions, and were available from the NCUA *Annual Report* since before 1959. The ratio of these assets to total assets was used to estimate these items for state-chartered credit unions. Annual reports issued by the NCUA and its predecessor were available since before 1959. Time deposits of credit unions at commercial banks were estimated at year-end; until 1974, they were treated as a residual, the difference between "cash" reported in the annual reports and estimated demand deposits. After 1974, the cash item excluded time deposits, which were then estimated by applying the ratio of time deposits to total assets in 1974 to total assets in later years. Year-end cash figures were available since before 1959 for federal credit unions, and since December 1964 for state-chartered credit unions from the annual reports.

Large Time Deposits in M3

The large time deposit component of the monetary aggregate M3 consists of time deposits over \$100,000 at all depositories less domestic interbank time deposits and time deposits due to other depositories, foreign commercial banks and foreign governments. The distinction between large and small time deposits essentially begins in 1961. Construction of large time deposit data beginning in 1961 is discussed by both Friedman and Schwartz (1970) and Beck (1978).