BOARD OF GOVERNORS
OF THE
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DIVISION OF MONETARY AFFAIRS

**STRICTLY CONFIDENTIAL (F.R)**
**CLASS II - FOMC**

June 27, 1990

TO: Federal Open Market Committee

FROM: Donald L. Kohn DLK

In February, Governor Angell suggested that the FOMC should no longer set ranges for M3 and debt, given uncertainties about the relationship of these aggregates to spending and prices, retaining only a range for M2. The attached memorandum addresses this issue.

The analysis in the memo suggests that, in general, M3 and debt do not add much to M2 in explaining variations in nominal income. However, it also notes that M2 itself does not have a very tight relationship with the objectives of policy, except over the very long run, and there may be periods in which changes in the structure of financial asset holdings imply that exclusive reliance on M2 would not be appropriate. The period of deposit deregulation in the early 1980s was one such period, but 1987 when demand for M2 shifted down and the FOMC allowed the aggregate to undershoot its range was another. As detailed in another memorandum being sent to the Committee, we seem to be experiencing another such unanticipated increase in M2 velocity in 1990 associated with the restructuring of the thrift industry. Under these circumstances, money or debt aggregates in addition to M2 still may have a useful role to play in providing guidance to the FOMC and in communicating the Committee's intention to the public.

Attachment

STRICTLY CONFIDENTIAL (FR) June 27, 1990
CLASS II - FOMC

# A REVIEW OF THE ROLES OF M3 AND DEBT IN MONETARY POLICY[1]


## SUMMARY

This memorandum examines the value of M3 and domestic nonfinancial sector debt as guides to monetary policy. The analysis generally is premised on the retention of M2 as a targeted monetary aggregate. The memorandum addresses the following questions: Do M3 and debt provide advance information on the course of the economy, particularly information that is not conveyed by M2? How reliable are the signals that they provide? What are the arguments for establishing multiple monetary and debt ranges? What are the arguments for establishing a single monetary range? What requirements for monetary and debt ranges must the Federal Reserve meet under the Humphrey-Hawkins Act? The analysis suggests the following conclusions:

- The conceptual basis for M2 is stronger than those for M3 and debt.
- Data on debt are somewhat less reliable and less timely than data on the monetary aggregates, although the differences probably are not large enough to be dominant considerations when assessing the usefulness of the debt measure as an indicator to be used in conjunction with M2.
- Under most circumstances, M3 and debt provide little information on incipient economic developments beyond that provided by M2; however, at times they do provide valuable information.
- Though M2 has had a stable relationship with prices over the long run, over short- and intermediate-length periods M2 has not been a highly reliable indicator of economic developments. This characteristic could cause difficulties if policy emphasis were placed on M2 alone.


1. Prepared by Richard Anderson and Brian Madigan, Division of Monetary Affairs.

- The Humphrey-Hawkins Act requires that the Federal Reserve report objectives and plans for monetary and credit aggregates. A literal reading of the statute would not require the Federal Reserve to report objectives and plans for an aggregate for which the FOMC has formulated no such objectives or plans. Nevertheless, the legislative history clearly indicates that the authors of the legislation contemplated that the Federal Reserve would establish objectives and plans for some measure of credit, although not necessarily the current measure of domestic nonfinancial sector debt.

CHARACTERISTICS OF M2, M3, AND DEBT

The usefulness of particular monetary and credit aggregates for monetary policy depends in part on the extent to which they have a reliable relationship with variables of more ultimate policy interest, such as aggregate income or prices. If reliable relationships exist, they may be exploitable provided the aggregates are themselves measured reliably and data on the aggregates are available on a timely basis. If a reliable relationship between the aggregate and, say, GNP exists in historical data, but early versions of the data--prior to measurement and seasonal adjustment on a "final" basis--do not reliably predict their final values or are not available on a timely basis, the usefulness of the aggregate is reduced. The reliability of such relationships, the timeliness of data, and the amount of "noise" as opposed to "signal" in the initial estimates of the data all are issues that can be assessed empirically, and are examined below.

The reliability of an aggregate's relationship with income and prices also might be seen as depending on the extent to which it is explainable on the basis of an accepted theory. Policymakers and the public are likely to be more confident about the signals received from a given aggregate if there is a sound conceptual foundation for a relationship between that aggregate and the economy and if empirical

correlations are consistent with that foundation. The following section reviews the concepts underlying the monetary and debt measures.

Concepts Underlying the Measures

M2 was designed as a broad measure of liquid wealth containing conventional transaction balances and fairly close substitutes.[2] The components of M2 are primarily the assets of households, smaller business firms, governmental units, and nonprofit organizations, rather than large corporations; demand deposits, overnight repurchase agreements, and overnight Eurodollar holdings are the main exceptions to this statement. M2 generally has the characteristic that the nominal value of its components does not fluctuate with the level of interest rates. In addition, a large fraction of M2 is federally insured or collateralized by federal obligations. For both reasons, balances in M2 generally involve very little risk of loss in nominal terms.

Of the two basic approaches to the analysis of money demand--transactions-based models and portfolio theory--portfolio theory is the more relevant for M2.[3] M2 includes the instruments that are used most

2. Concepts behind the monetary aggregates were discussed by Thomas D. Simpson in "A Proposal for Redefining the Monetary Aggregates", Federal Reserve Bulletin, Vol. 65, January 1979, pp. 13-42, and in "The Redefined Monetary Aggregates", Federal Reserve Bulletin, Vol. 66, February 1980.

3. Transactions models of money demand are based on the medium of exchange concept of money. Such models are basically inventory models in which deposit holders trade of the opportunity costs of holding money against the transaction costs of moving in and out of interest-bearing investments. See William J. Baumol, "The Transactions Demand for Cash: An Inventory Theoretic Approach", Quarterly Journal of Economics, vol. 66, November 1952, pp. 545-556; James Tobin, "The Interest Elasticity of Transactions Demand for Cash", Review of Economics and Statistics, vol. 38, August 1956, pp. 41-247; Merton H. Miller and Daniel Orr, "A Model of the Demand for Money by Firms", Quarterly Journal of Economics, vol. 80, August 1966, pp 413-45.

(Footnote continued on next page.)

frequently to effect transactions (currency, demand deposits, and other checkable deposits), but a larger fraction of the aggregate is accounted for by savings-type instruments such as regular savings accounts, MMDAs, small time deposits, and money market mutual fund shares.[4] (Moreover, as evidenced by their low turnover rates, OCDs clearly have a significant savings component.) The staff's approach to modeling M2 demand relies heavily on the opportunity cost of M2, as both the transactions approach and the portfolio approach dictate. However, contrary to the portfolio model, the staff's empirical work uses GNP and personal consumption expenditures, rather than wealth, as the "scale variables."[5] On the whole, efforts to model M2 have been reasonably successful--that is, the aggregate appears to have a fairly stable demand function.[6] Results of simulating the staff M2 model are frequently reported to the FOMC and form a basis for analysis and projections reported in the bluebook. However, despite the general stability of M2 demand, there

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Portfolio models of money demand consider money as one of a number of alternative portfolio investments, with consideration to the expected return on monetary assets, the variability of this return, and its covariation with returns on alternative investments. See James Tobin, "Liquidity Preference as Behavior Towards Risk", Review of Economic Studies, vol. 25, February 1958, pp. 65-86.

4. Money market mutual fund shares and MMDAs do have limited transactions features.

5. Wealth performs only slightly better than GNP and personal consumption expenditures as scale variables in the staff's M2 equation. Given the slight improvement using wealth and the difficulties of forecasting it, the staff chose to use GNP and personal consumption expenditures.

6. See, for example, David H. Small and Richard D. Porter, "Understanding the Behavior of M2 and V2", Federal Reserve Bulletin, Vol. 75, April 1989, pp. 244-254, and George Moore, Richard Porter, and David 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, forthcoming, 1990.

have been periods of large prediction errors for this function, such as the current quarter. Moreover, the staff has had problems modeling the supply side of M2--that is, the setting of deposit offering rates following deregulation.

M3 adds to M2 certain managed liabilities of depository institutions--large time deposits, term repurchase agreements, and term Eurodollar agreements--as well as shares in money market mutual funds that can be held only by institutions. Because M3 includes a significant share of managed liabilities--which are wholesale money market instruments--M3 cannot be viewed as a measure of the liquidity demanded by retail moneyholders.[7]

Given the composition of M3, specifying a simple and usable conceptual framework in which to view M3 is difficult. The Board staff tends to analyze movements in M3 in terms of the interaction between the demand for M2, on the one hand, and bank and thrift credit and the sources of financing that credit, on the other.

The staff's analytical approach to M3 is based on an assumption that depository institutions tend to adjust all their managed liabilities in response to changes in the gap between net credit extensions and retail deposit inflows. The approach can best be explained through examples. Suppose bank credit increased in the face of unchanged demand for retail deposits (and M2). The staff would expect banks to fund the increase by issuing a range of additional managed liabilities. Some of these additional managed liabilities, such as

7. From one perspective, the distinction between M2 and M3 has eroded over time, as inflation has reduced the "real" level of the $100,000 boundary between small and large time deposits and deregulation has enabled depositories to manage retail as well as wholesale liabilities.

large time deposits, are included in the non-M2 component of M3 and would thus tend to boost M3 relative to M2. The remainder of the managed liabilities, such as borrowings from foreign branches, are not included in the monetary aggregates at all, and thus would not necessarily augment M3 further relative to M2.[8]

Similarly, if demand for retail deposits and M2 increased while bank credit was unchanged, banks would reduce managed liabilities by the amount of the increase. Because only part of the reduction would likely come at the expense of liabilities included in the non-M2 component of M3 while some would involve liabilities not in the aggregates, M3 would be expected to rise by some fraction of the increase in M2 demand. However, the staff would not necessarily expect these relationships to be stable over time, and has not constructed explicit models that would make quantitative predictions of these fractions.

Questions about the stability of a demand relationship for the non-M2 component of M3 arise because most of the elements of the non-M2 component of M3 are instruments that are issued and traded in open markets and therefore are close substitutes for other short-term money market instruments such as term federal funds, repurchase agreements issued by nonbank dealers, commercial paper, Treasury bills, and bankers acceptances. (The last three instruments enter the monetary aggregates only at the level of L.) Given this very high degree of substitutability, the interest rates on these instruments fluctuate closely with those on other open market instruments, and therefore their opportunity cost with respect to open market rates would be expected to be

8. Increased borrowings from foreign branches would tend to boost M3 if foreign branches funded the loans to U.S. offices by issuing additional Eurodollar deposits to U.S. residents.

relatively constant. Thus, the quantity demanded would not be expected to bear a stable relationship with the level of market interest rates, and a standard money demand function for these non-M2 components cannot be estimated. A similar difficulty exists on the supply side of the market: Properly specifying and estimating a supply function for the non-M2 components would be extremely difficult given their close substitutability for other bank and thrift managed liabilities.

Debt also suffers from lack of an accepted theory of its determination. A study prepared as background for the FOMC's 1983 consideration of whether to adopt a range for debt noted that

> "Several aggregations of debt instruments have been proposed as intermediate targets or indicators for stabilization policy. The dissimilarities in the measures proposed suggest the absence of a common analytical basis. Indeed, the economics profession appears to lack a well specified theoretical framework that would help in the choice of a credit aggregate. Existing theoretical and empirical knowledge does not provide much concrete guidance with regard to the aggregative patterns of leverage or liquidity management in the economy."[9]

While recognizing these drawbacks, the FOMC in 1983 elected to establish a monitoring range for domestic nonfinancial sector debt. In part, the FOMC's decision probably reflected some dissatisfaction with the existing credit measure, bank credit, during a period when credit was increasingly likely to be funded either through intermediaries other than banks or directly in the markets. In addition, domestic nonfinancial sector debt was supported by prominent analysts outside the Federal Reserve who emphasized its historically close empirical correlation with

9. "Selection of a Credit Aggregate", appendix to Monetary Policy Alternatives [bluebook], February 4, 1983.

GNP.[10] However, subsequent experience with the debt measure (discussed below) has, if anything, reinforced the profession's agnosticism about the relationship of debt to income. Moreover, there remain a number of serious conceptual issues involved in the measurement of debt that stem from the absence of generally accepted theory on such issues as the determinants of leverage.[11]

Reliability of the Data

Reasonably accurate data on both M2 and M3 are available on a frequent and timely basis. Weekly source data are available for 80 percent of the components of both M2 and M3. Seasonally adjusted weekly data for both aggregates are published ten days after the end of the "as of" week. Seasonally adjusted monthly data are published each month approximately two weeks after the end of the month.

Revisions to the monetary series reflect both corrections of underlying data as well as the receipt of new data on components that previously had been estimated. Revisions to the weekly deposits data are incorporated into the monetary aggregates for four weeks. Revisions to most other data sources are incorporated as they are received. Between 1987 and 1989, the average absolute revision to the level of weekly M2 after four weeks was $1.9 billion; the comparable figure for

10. Benjamin Friedman was a particularly vocal proponent of domestic nonfinancial sector debt. See, for instance, "Implications of the Government Deficit for U.S. Capital Formation", in The Economics of Large Government Deficits, Federal Reserve Bank of Boston Conference Series, No. 27, 1984.

11. Related questions are: Should debt be measured at face value or market value? Should equity issuance be included? If not, what is the proper treatment of debt issues with equity-like features, such as junk bonds? Should foreign trade debt and direct foreign investment be included? How should financial intermediation activities of the federal and state and local governments be treated?

M3 was $3.7 billion.[12] In percentage terms, these revisions are relatively small: 0.06 percent and and 0.10 percent of the levels of M2 and M3, respectively. Analogous figures for the revisions to first-published monthly levels after four weeks are $1.2 billion for M2 and $2.0 billion for M3, or 0.04 percent and 0.05 percent, respectively.

Estimates of the monetary aggregates also are revised annually, reflecting both the "benchmark" incorporation of data received after the four-week cutoff for weekly revisions and revised seasonal factors. For the period from 1985 to 1989, the benchmark revisions resulted in an average absolute revision of fourth-quarter to fourth-quarter M2 growth during the previous year of only 0.08 percentage point. The comparable figure for M3 is about twice as large at 0.2 percentage points, but is still small in absolute terms. For quarterly average growth rates, benchmark revisions are somewhat larger, and reflect revised seasonal factors as well as revisions to the not-seasonally-adjusted data. Between 1985 and 1989, the average revision to M2 growth was 0.5 percentage points for quarters in the previous year and, for M3, 0.4 percentage points.

Data on debt are available on a less timely basis than the monetary aggregates, and there is reason to believe that they are somewhat less accurate. For private securities, data on volumes outstanding are relatively sparse and not very timely. These data are obtained largely by recording gross flows through securities markets, rather than from the balance sheets of issuers. As a consequence, the retirement of outstanding corporate and municipal debt often is not measured directly,

12. The large revisions to the non-M2 component of M3 have stemmed primarily from revisions to term Eurodollars and term repurchase agreements.

and must be estimated on the basis of quite limited information. In addition, data on privately issued debt are difficult to obtain. This problem has become more important as this means of finance has expanded. On the other hand, the quantity of intermediated debt is measured fairly accurately, though typically on a monthly or quarterly--rather than weekly--basis, and in some cases with a considerable lag. The net quantity of debt issued by the Treasury also is measured accurately and on a timely basis. Federal agency balance sheet data likewise are quite accurate, but are available with a considerably greater lag. Although the federal sector data themselves are accurate, questions arise about whether all federal debt is best classified as nonfinancial sector debt. For example, borrowing to provide working capital for the RTC--that is, replacing thrift liabilities with federal government liabilities--increases the debt measure, as currently constructed. Similarly, state and local advance refunding issues increase the domestic nonfinancial debt measure, even though the effect of this activity has aspects of financial intermediation.

The Board's measure of domestic nonfinancial sector debt is published monthly, with a lag of approximately six weeks. When a month is first published, the data depend heavily on partly or wholly estimated series. Approximately 40 percent of the first-published figure reflects complete data; 30 percent is based on partly-estimated data; and 30 percent is estimated based only on the history of the series and on correlations with other, observable measures. Very early, confidential estimates of debt for a given month are made available to the Board and Reserve Bank Presidents just after the monetary data for that month

are published.[13] However, these estimates are based on very few hard data.

The historical series on debt is revised frequently as new basic data become available. Between 1987 and 1989, average revisions to the monthly average level of debt four weeks after initial publication was $6.5 billion. This revision is approximately 0.08 percent of the level of the series.[14] Although this average revision is somewhat larger than those to the aggregates, as reported above, it is probably not a large enough value to be significant for policy. Data for the previous four to six quarters are benchmarked every three months. The entire series is benchmarked and seasonally adjusted each September.

In part, the reliability of an aggregate may be assessed in terms of the degree to which its movements reflect trend rather than "noise." Table 1 presents measures of the volatility of data on the monetary and debt aggregates. The upper panel shows standard deviations of growth rates of the aggregates for quarterly, monthly, and (for the monetary aggregates) weekly data. The lower panel shows similar figures for deviations of the growth rates from a measure of trend. (The measure of trend used is a nine-month moving average of annualized growth rates.) At monthly and quarterly frequencies, M2 is the most volatile aggregate and debt the least volatile aggregate; this ordering holds whether or not the growth rates are adjusted for trend. By contrast, at a weekly frequency, the volatility of M3 is a bit larger than for M2. However, it should be emphasized that both the small revisions

13. These estimates can be found in "Banking and Monetary Aggregates", prepared on a weekly basis at the Board.
14. The revision to the monthly growth rates would tend to be smaller to the extent that the previous month's level was revised in the same direction.

Table 1
Standard Deviation of Growth Rates of M2, M3, and Debt[1]
(percentage points, annual rate)

| | Quarterly Data | |
|---|---|---|
| | 1959 - 1989 | 1980 - 1989 |
| M2 | 3.2 | 3.4 |
| M3 | 3.2 | 2.8 |
| Debt | 2.4 | 2.1 |
| | **Monthly Data** | |
| M2 | 4.0 | 4.7 |
| M3 | 3.9 | 3.8 |
| Debt | 2.7 | 2.5 |
| | **Weekly Data** | |
| M2 | 52.1 | 88.0 |
| M3 | 65.4 | 110.6 |

Standard Deviation of Growth Rates of M2, M3, and Debt[1]
Deviation of Growth Rates From Trend[2]
(percentage points, annual rate)

| | Quarterly Data | |
|---|---|---|
| M2 | 1.4 | 2.0 |
| M3 | .9 | .9 |
| Debt | .7 | .8 |
| | **Monthly Data** | |
| M2 | 2.8 | 3.8 |
| M3 | 2.2 | 2.5 |
| Debt | 1.4 | 1.7 |
| | **Weekly Data** | |
| M2 | 52.0 | 90.1 |
| M3 | 65.3 | 113.2 |

1. Seasonally adjusted data.
2. Trend is measured as a three-quarter, nine-month, or 39-week centered moving average of annualized growth rates.

of the debt series and its relatively low volatility may be artifacts of the infrequent availability of some of its source data. The estimates of some of its components involve a number of techniques that tend to smooth the data, such as interpolating quarterly or annual data or holding the level of certain components at the last observed value.

ASSOCIATION OF M2, M3, AND DEBT WITH NOMINAL GNP

Velocity of M2, M3, and Debt

The information content of monetary and debt aggregates can be assessed partly in terms of the extent to which their velocities are stable or predictable. As shown in Chart 1, the velocity of M2 (V2) has fluctuated substantially over the past three decades, but appears to tend to return to a mean of approximately 1.65.[15] The movements in V2 are explained fairly well by the opportunity cost of M2, as shown in the upper panel of Chart 2. (The opportunity cost of M2 is measured as the three-month Treasury bill rate minus the average return on M2 components; in the chart it is drawn as a two-quarter moving average.)

In contrast to the flat trend of V2, V3 tended to decline on balance between 1959 and the mid 1980s. As shown in Chart 3, V3 tended to track the quantity of credit intermediated through depository institutions relative to GNP, confirming the importance of credit movements in the determination of M3. The lower panel of Chart 2 shows that, as is the case for M2, movements in opportunity costs also have an impact on M3. However, this association stems largely from the M2 component rather than the non-M2 part: As suggested by chart 4, the

15. Long-run stability of V2 is a basis for the staff's work on P*, reported in Jeffrey J. Hallman, Richard D. Porter, and David H. Small, "M2 per Unit of Potential GNP as an Anchor for the Price Level", Staff Study 157, Board of Governors of the Federal Reserve System, April 1989.

Chart 1

## Velocities of Selected Aggregates and Debt, 1959-1990

(quarterly, seasonally adjusted annual rate)

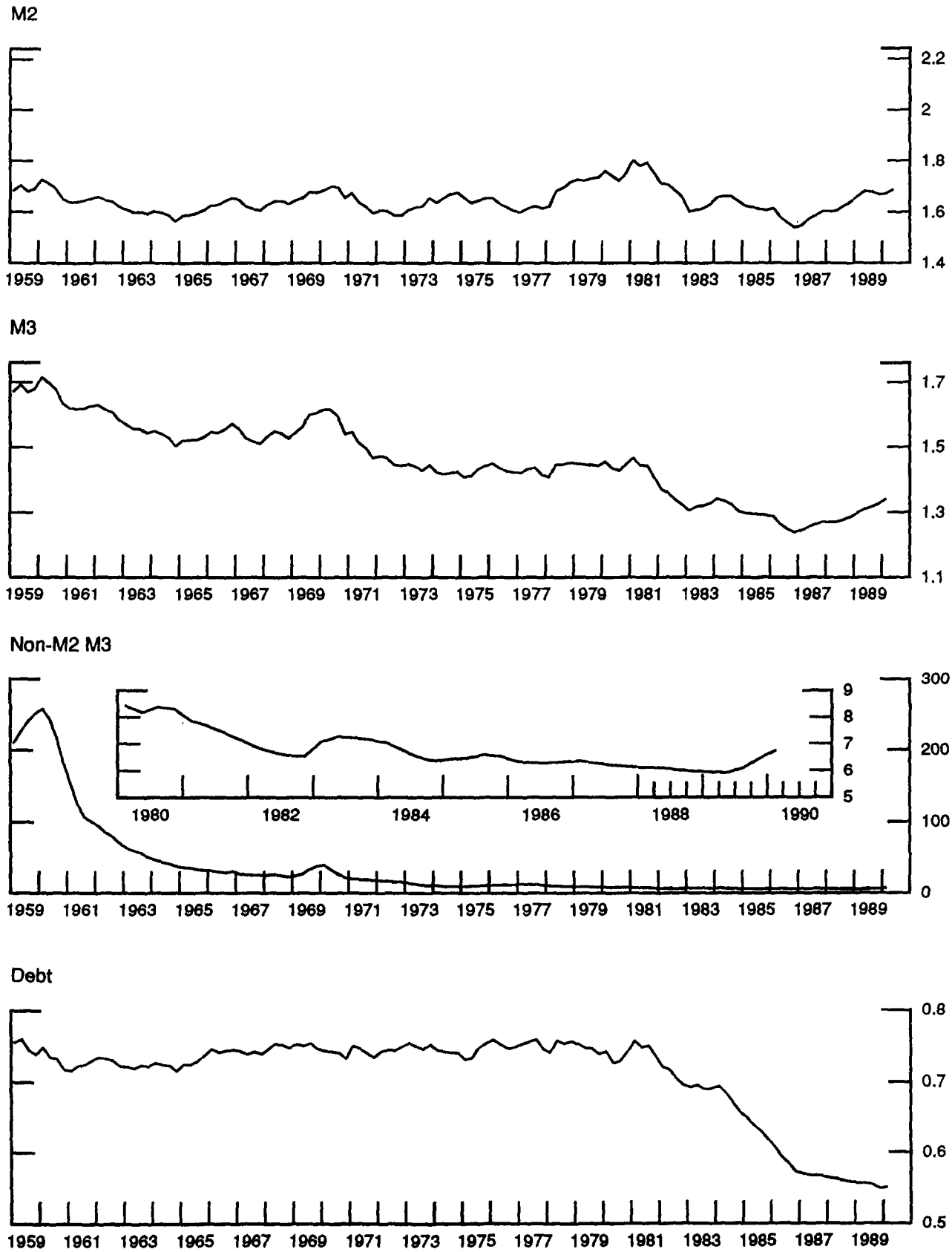
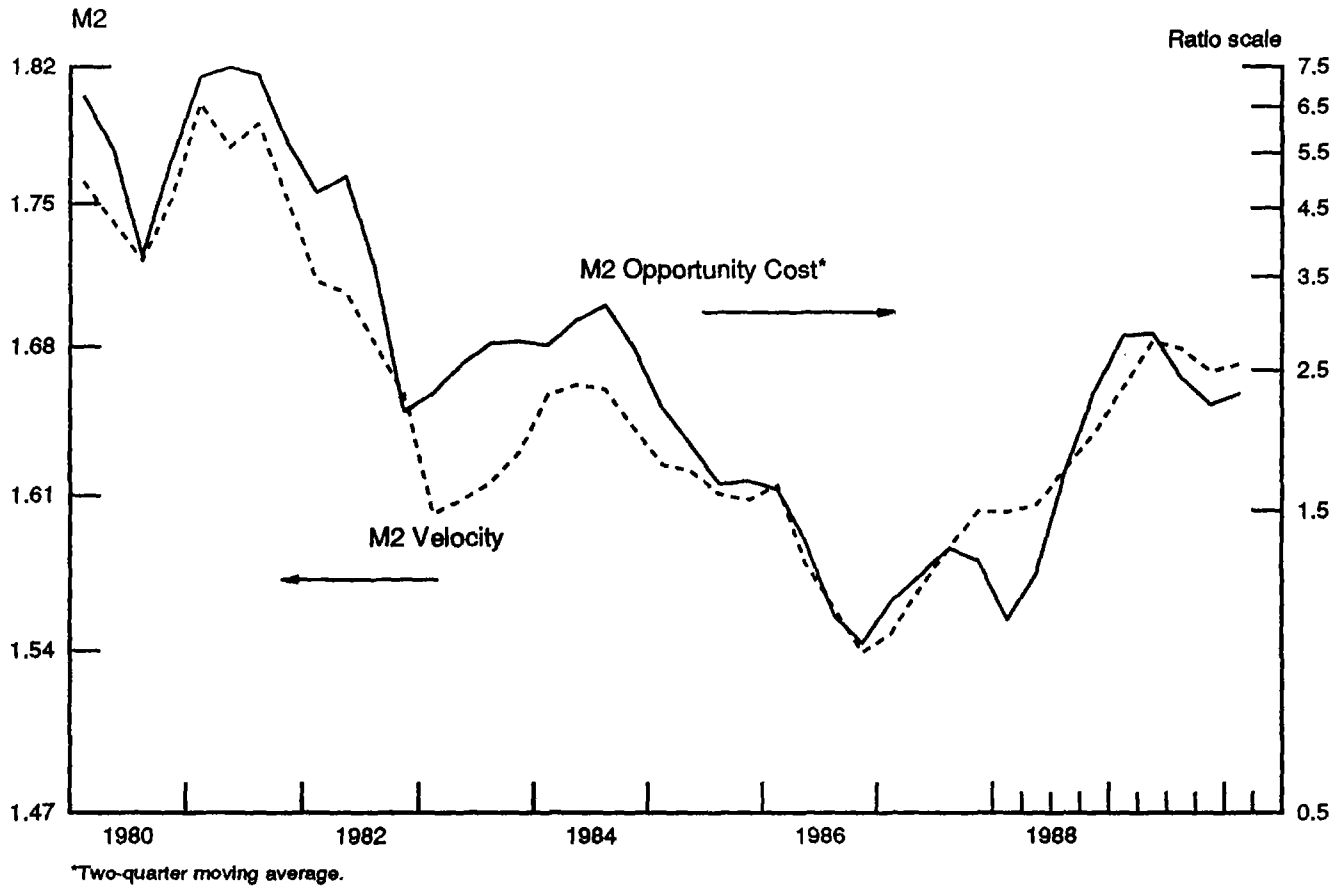
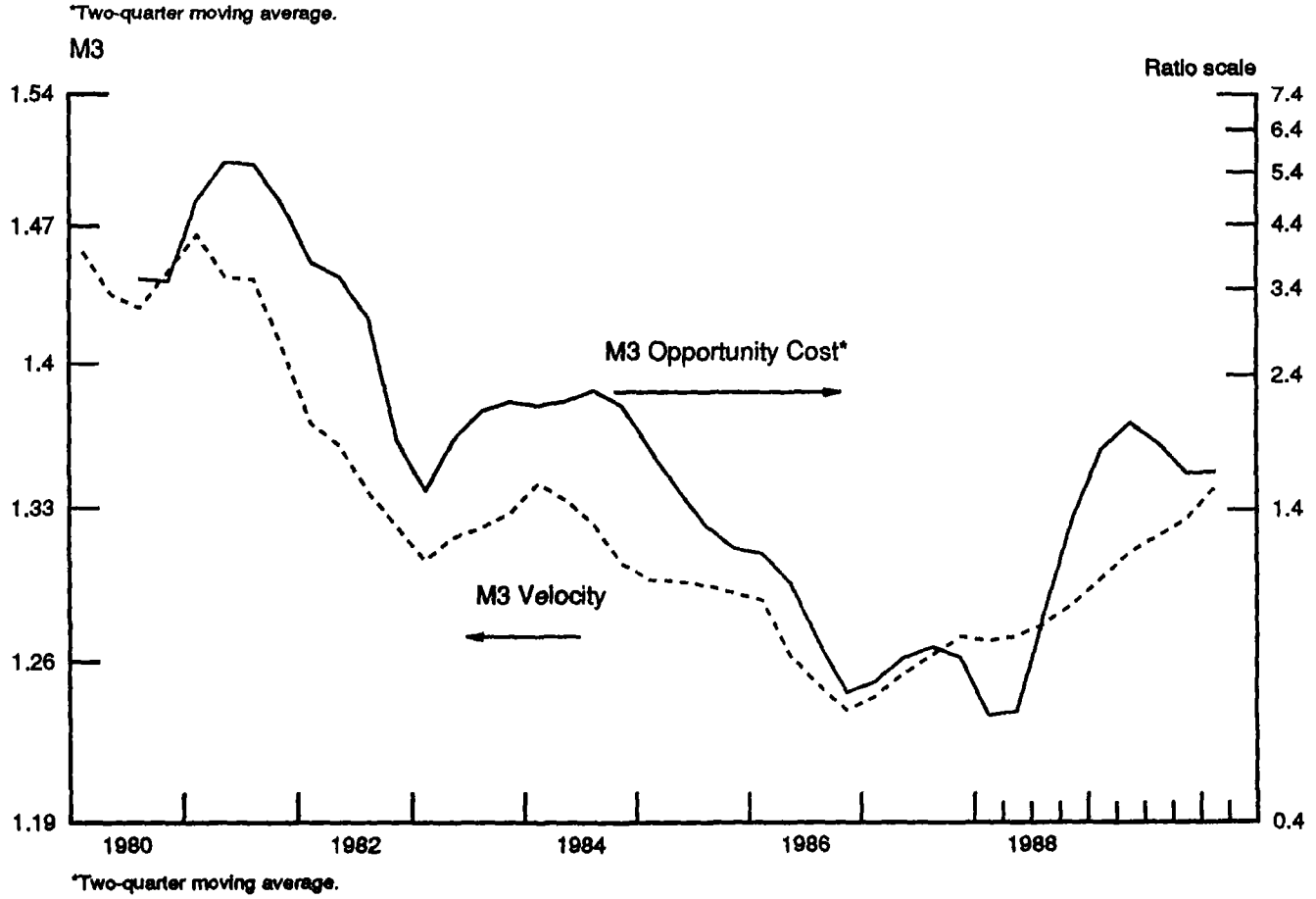


Chart 2

## M2 and M3 Velocity and Opportunity Cost




*Two-quarter moving average.

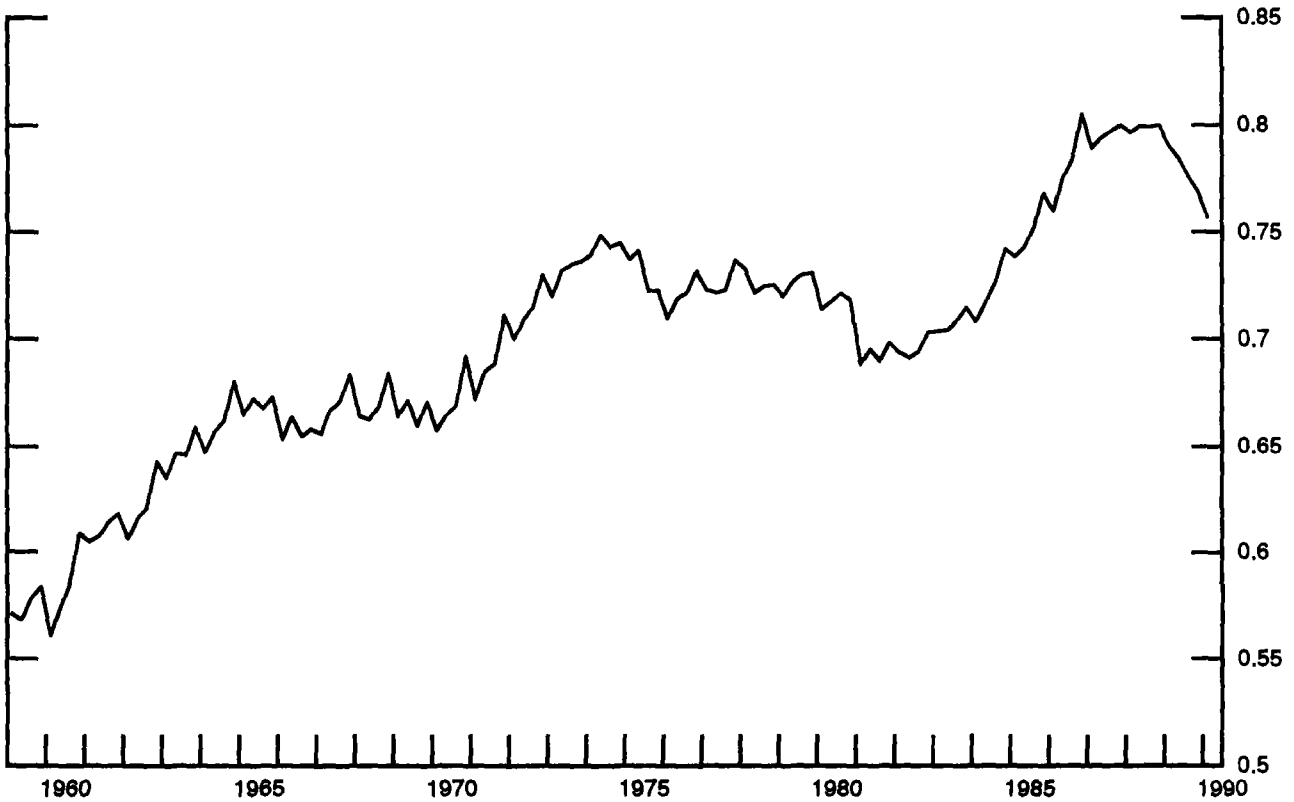



*Two-quarter moving average.

Chart 3

## Ratio of Bank and Thrift Credit to GNP

(quarterly data)




## Inverse of M3 Velocity

(quarterly data)

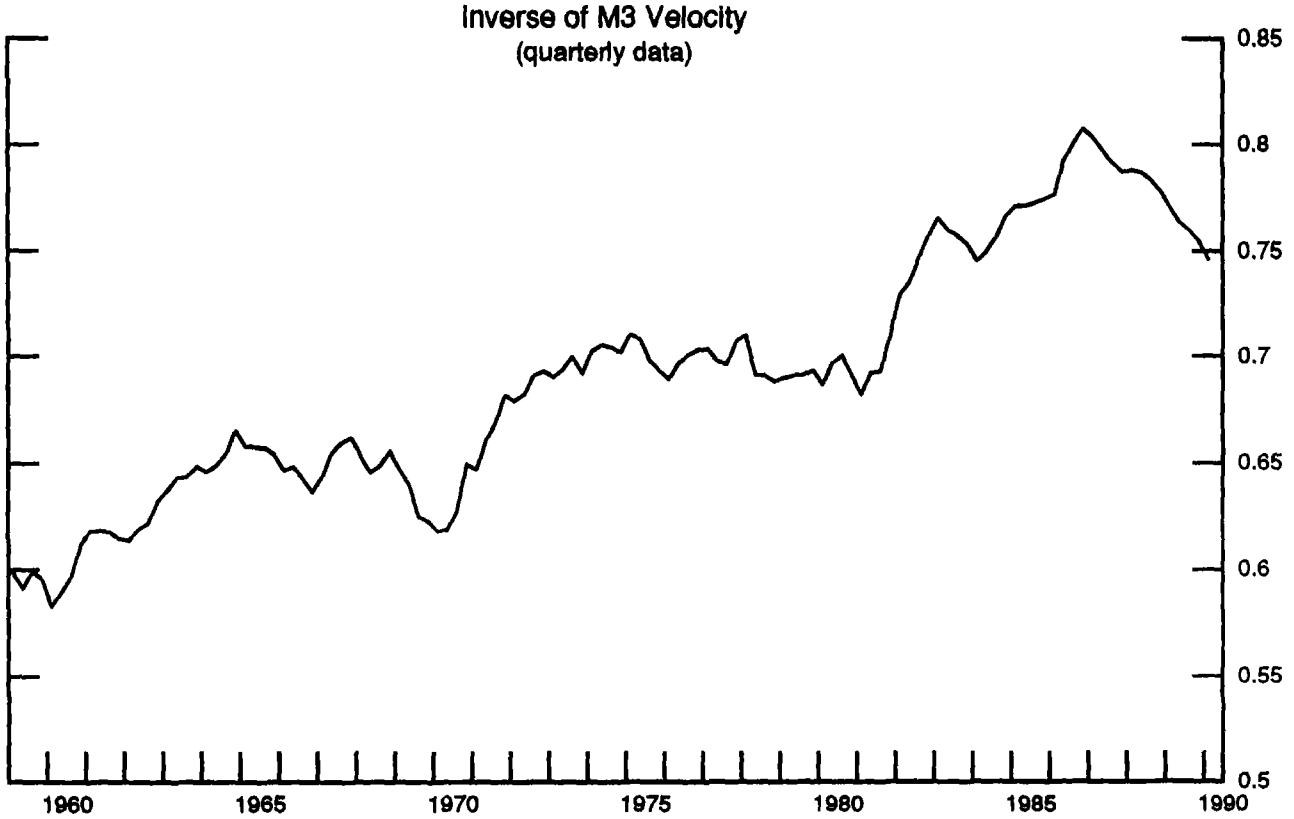
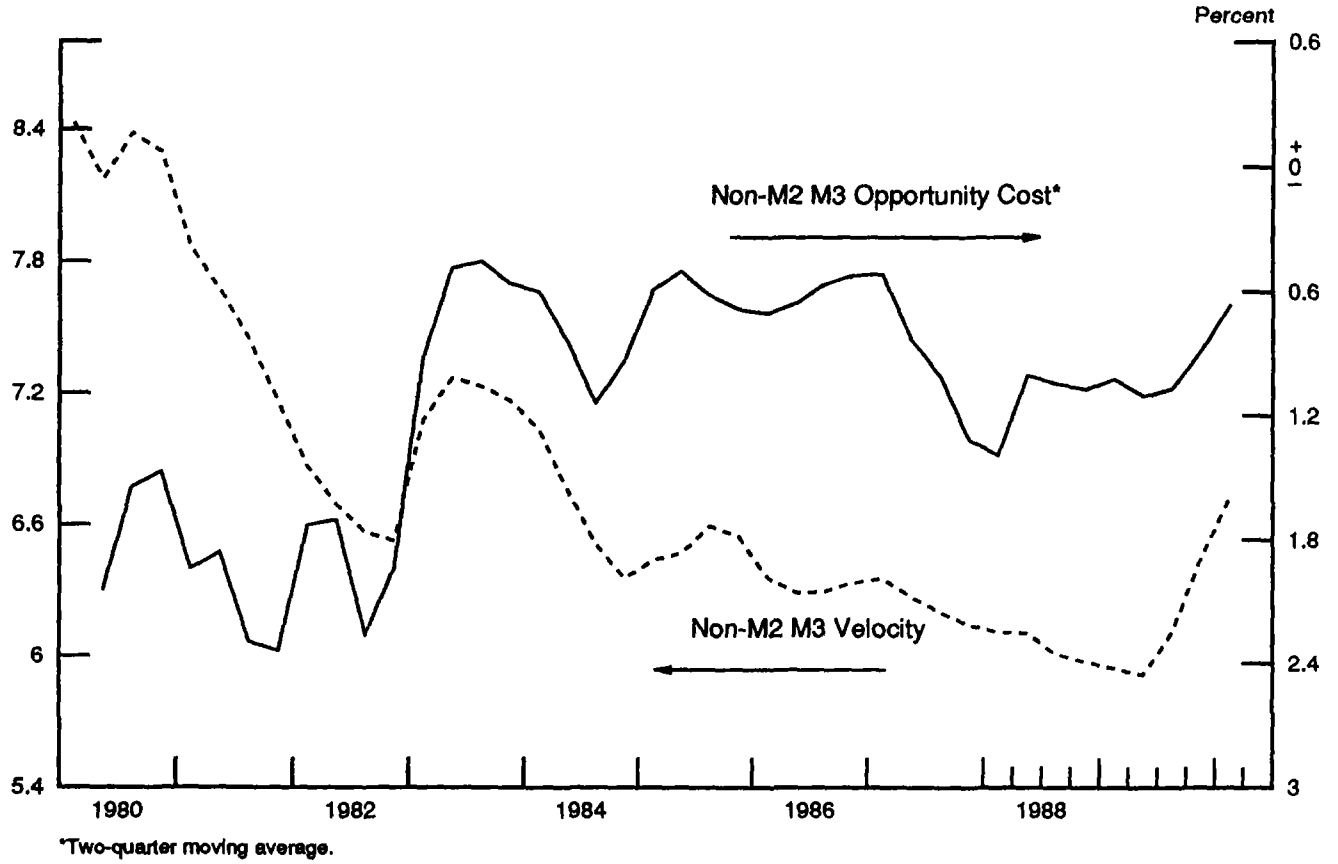


Chart 4

## Non-M2 M3 Velocity and Opportunity Cost




*Two-quarter moving average.

velocity of the non-M2 component of M3 is less correlated with its opportunity cost than is M2, casting some doubt on the possibility of empirically modeling this component.[16]

Over the past three years, M3 growth has been slower than that of nominal GNP, in contrast to its earlier pattern. The slower growth reflects, to a small degree, the slower decline in debt velocity in the last three years. More important, though, is a shift in financing patterns away from depository institutions and toward other intermediaries and the open market. Financial innovation and stricter capital standards for banks and thrifts--and most recently the closure of hundreds of insolvent institutions--have reduced the share of credit intermediated through depositories. Given demands for retail deposits, depository institutions have had reduced need to raise funds in wholesale markets, limiting growth of the non-M2 component of M3 and M3 itself.

The bottom panel of Chart 1 shows the well-known and somewhat puzzling behavior of debt velocity. Over the 1960s and 1970s the level of debt was quite stable relative to nominal GNP. During the 1980s,

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16. Data on returns on term RPs and institution-only money funds were not readily available. Consequently, charts 2 and 4 use the three-month CD rate as a proxy for the rate on term RPs and a weighted average of lagged money market yields as the return on institution-only money funds, with the weights equal to the shares of various assets in the funds' portfolios.

Like both panels of chart 2, chart 3 uses three-month Treasury bills as the alternative asset in measuring the opportunity cost of the non-M2 component of M3. Given their rather easy availability to retail investors, the use of Treasury bills as the alternative asset for M2 is logical and also seems supported by the data. The choice of an alternative asset for the non-M2 component of M3 is not so clear, as investors in the assets included in this component have access to a much broader range of alternatives. Nevertheless, the lower association depicted in chart 3 raises doubts about the possibility of estimating a stable demand function for the non-M2 component of M3.

however, the velocity of debt dropped quite sharply, especially during the 1981-86 period. During this period, debt growth surged owing to large federal budget deficits, a wave of corporate restructuring activity, and heavy tax-exempt borrowing in advance of tightened tax restrictions. Over the last few years, debt velocity continued to decline, but at a much less steep rate as the importance of these factors diminished in varying amounts.

Econometric Relationships between the Aggregates and GNP

Because this paper assumes that a target is set for M2, we report on econometric tests of the quantity of information conveyed by M3 and debt that is not already conveyed by M2. The econometric methodology employed is that of vector autoregressions. This approach involves the estimation of equations that simultaneously explain (in a statistical sense) the determination of a number of variables. In this case, the system of equations explains nominal GNP, M2, and either the non-M2 component of M3 or debt, using contemporaneous and lagged values of all the variables. After the equations are estimated, statistical tests (F tests) are used to assess the marginal contribution of the non-M2 component of M3 and debt to the explanation of GNP.

Table 2 shows the results of these tests, with figures for the non-M2 component of M3 in the upper panel and figures for debt in the lower panel. Results are shown both for equations estimated in level terms and equations estimated in percentage changes with an error cor-

Table 2

Test Statistics for Marginal Contribution of Non-M2 M3 and Debt
to Forecasts of Nominal GNP and Related Variables, Three Equation VARs
(* denotes significance at five percent level)

| | Equation (Dependent Variable) | | | |
|---|---|---|---|---|
| | **GNP** | M2 | Non-M2 M3 | Debt |
| 1. Tests for Non-M2 M3 | (1) | (2) | (3) | (4) |
| A. VAR Model Estimated in Levels | | | | |
| Sample: 1959 Q1 - 1989 Q4 | | | | |
| M2 | **3.47*** | -- | 1.00 | n.a. |
| non-M2 M3 | **0.77** | 1.33 | -- | \| |
| GNP | -- | 2.31 | .69 | \| |
| Sample: 1980 Q1 - 1989 Q4 | | | | |
| M2 | **2.18** | -- | 1.59 | n.a. |
| non-M2 M3 | **1.43** | 2.89* | -- | \| |
| GNP | -- | 1.32 | .86 | \| |
| B. VAR Model Estimated in Percent Changes with Error Correction Term | | | | |
| Sample: 1959 Q1 - 1989 Q4 | | | | |
| M2 | **3.10*** | -- | .73 | n.a. |
| non-M2 M3 | **0.55** | .75 | -- | \| |
| GNP | -- | 1.49 | .37 | \| |
| Sample: 1980 Q1 - 1989 Q4 | | | | |
| M2 | **1.52** | -- | 1.29 | n.a. |
| non-M2 M3 | **3.00*** | 1.24 | -- | \| |
| GNP | -- | .43 | 1.18 | \| |
| 2. Tests for Nonfinancial Debt | | | | |
| A. VAR Model Estimated in Levels | | | | |
| Sample: 1959 Q1 - 1989 Q4 | | | | |
| M2 | **4.46*** | -- | n.a. | 10.93* |
| Debt | **2.12** | .32 | \| | -- |
| GNP | -- | 1.97 | \| | 3.24* |
| Sample: 1980 Q1 - 1989 Q4 | | | | |
| M2 | **1.61** | -- | n.a. | 3.41* |
| Debt | **.50** | 1.10 | \| | -- |
| GNP | -- | 1.42 | \| | 1.78 |
| B. VAR Model Estimated in Percent Changes with Error Correction Term | | | | |
| Sample: 1959 Q1 - 1989 Q4 | | | | |
| M2 | **3.38*** | -- | n.a. | 8.58* |
| Debt | **.54** | .12 | \| | -- |
| GNP | -- | 1.40 | \| | 2.17 |
| Sample: 1980 Q1 - 1989 Q4 | | | | |
| M2 | **4.16*** | -- | n.a. | 3.30* |
| Debt | **1.27** | 1.24 | \| | -- |
| GNP | -- | .90 | \| | 1.12 |

Notes: 1. All data are quarterly levels, seasonally adjusted. Four lags are used in each model.
2. Each statistic is a test of the null hypothesis that all four coefficients on lagged non-M2 M3 or debt equal zero.

rection term.[17] Asterisks indicate variables that contribute marginal information at the five percent level of statistical significance. Column 1 is of primary interest, showing the significance of M2, non-M2 M3, and debt in explaining nominal GNP. The results are somewhat mixed. For both levels and percent changes, M2 contributed significant marginal information over the entire sample period from 1959 to 1989, although for the 1980s M2 did not contribute significant information in either levels or percent changes. In contrast, the non-M2 component of M3 contributed significant information only in percent change terms and only during the 1980s. For debt, the results are quite one-sided: In no case did debt contribute statistically significant information.[18]

An alternative approach for assessing the usefulness of the monetary aggregates relies on simulations of a monetary rule under a structural econometric model such as the Board staff's MPS model. The staff reported such simulations to the FOMC in December 1987.[19] Unfortunately, this approach requires the availability of estimated structural equations (such as demand equations) for the aggregates of interest. Because no demand equations are available for M3 and debt, the 1987 analysis did not consider these aggregates. Rather, the study focused on M1-A, M1, and M2. The study concluded that "... the absolute

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17. The error-correction specification assumes the existence of a long-run linear relationship between the logs of the variables. Estimates of the cointegrating vector, obtained by ordinary least squares regression of the log of GNP on the log of the explanatory variables, are used as known parameters in estimating the error correction form of the system of equations.
18. A four-equation VAR model that includes interest rates also was estimated. The interest rate used was the three-month Treasury bill. The results for M2 and non-M2 M3 in explaining GNP were comparable to those discussed in the text. Debt was found to be significant in forecasting GNP over the 1959-89 period but not in the 1980-89 period.
19. "An Evaluation of M1-A as an Indicator and Intermediate Target and Comparisons with M1 and M2", December 9, 1987.

performance of all of the aggregates in stabilizing prices and incomes is not especially good." According to the simulations, keeping M2 along a preset baseline would result in an average control error for the level of nominal GNP of 2.0 percent after four quarters and 6.1 percent after five years. Corresponding figures for prices are 0.9 percent and 4.6 percent, respectively; for real GNP, the figures are 1.9 percent and 6.4 percent, respectively.

EXPERIENCE WITH M2, M3, AND DEBT AGGREGATES AND RANGES

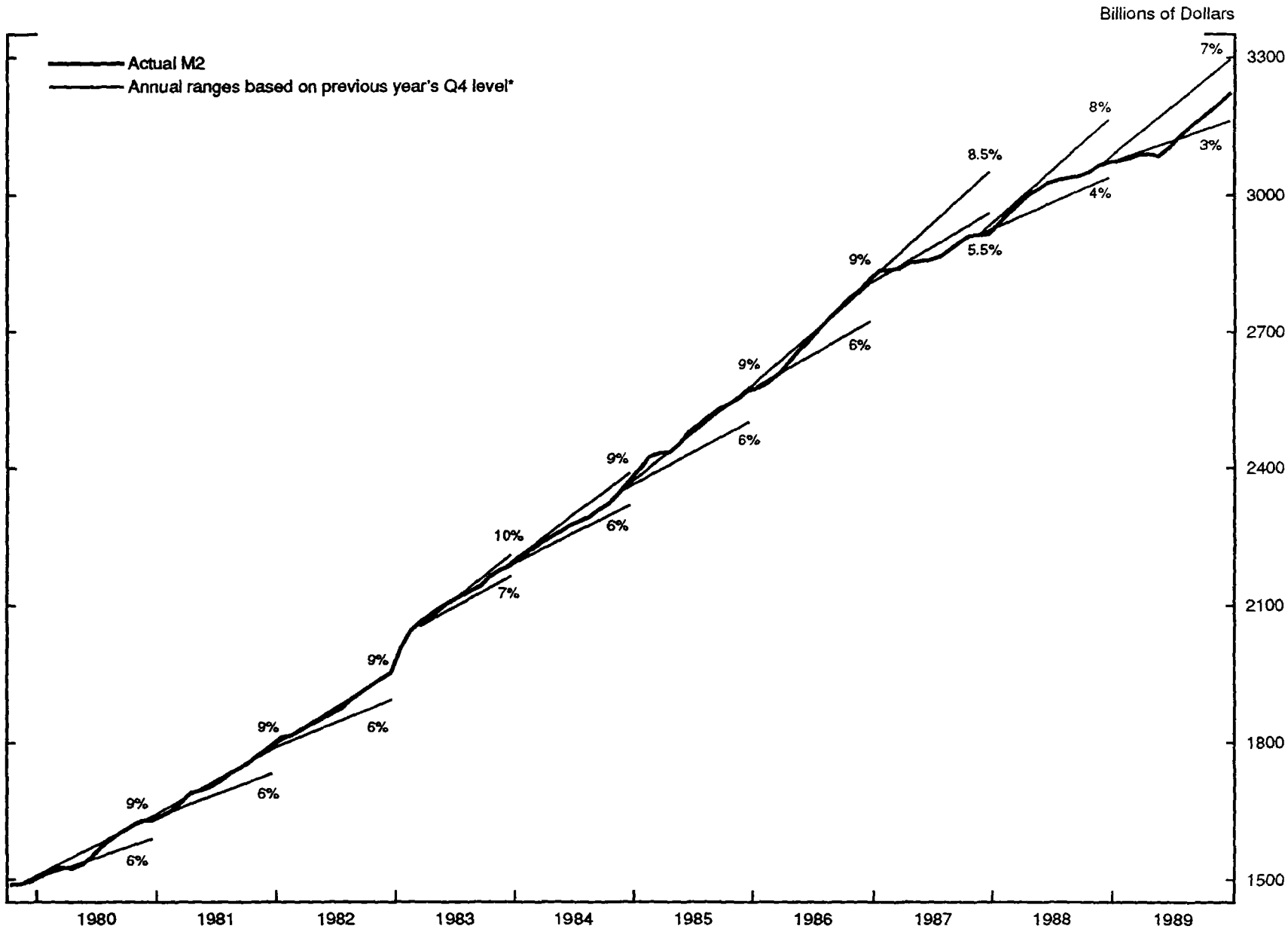
In part, the usefulness of an aggregate for monetary policy can be assessed in terms of the degree to which the FOMC is able to set ranges that would encompass likely growth in that aggregate in circumstances under which the Committee's objectives for income and prices were achieved. If setting such a range for some particular aggregate were difficult, the Federal Reserve would frequently find it necessary to explain to the Congress and the public why the range had been missed, tending to reduce the Federal Reserve's effectiveness in communicating its objectives and diminishing its credibility. This section examines the Federal Reserve's experience with monetary and credit ranges in the 1980s.

The FOMC has set annual target ranges for M2 and M3 since 1979 and monitoring ranges for domestic nonfinancial sector debt since 1983.[20,21] The ranges as well as actual levels of the aggregates for the period since 1980 are shown in Charts 5, 6, and 7. Until 1988, the ranges for the aggregates generally were three percentage points wide.

20. The FOMC has not set a target range for M1 since 1986, owing to the less reliable relationship between that aggregate and nominal GNP.
21. Before 1983, the Committee set a range for bank credit rather than for domestic nonfinancial sector debt.

Chart 5

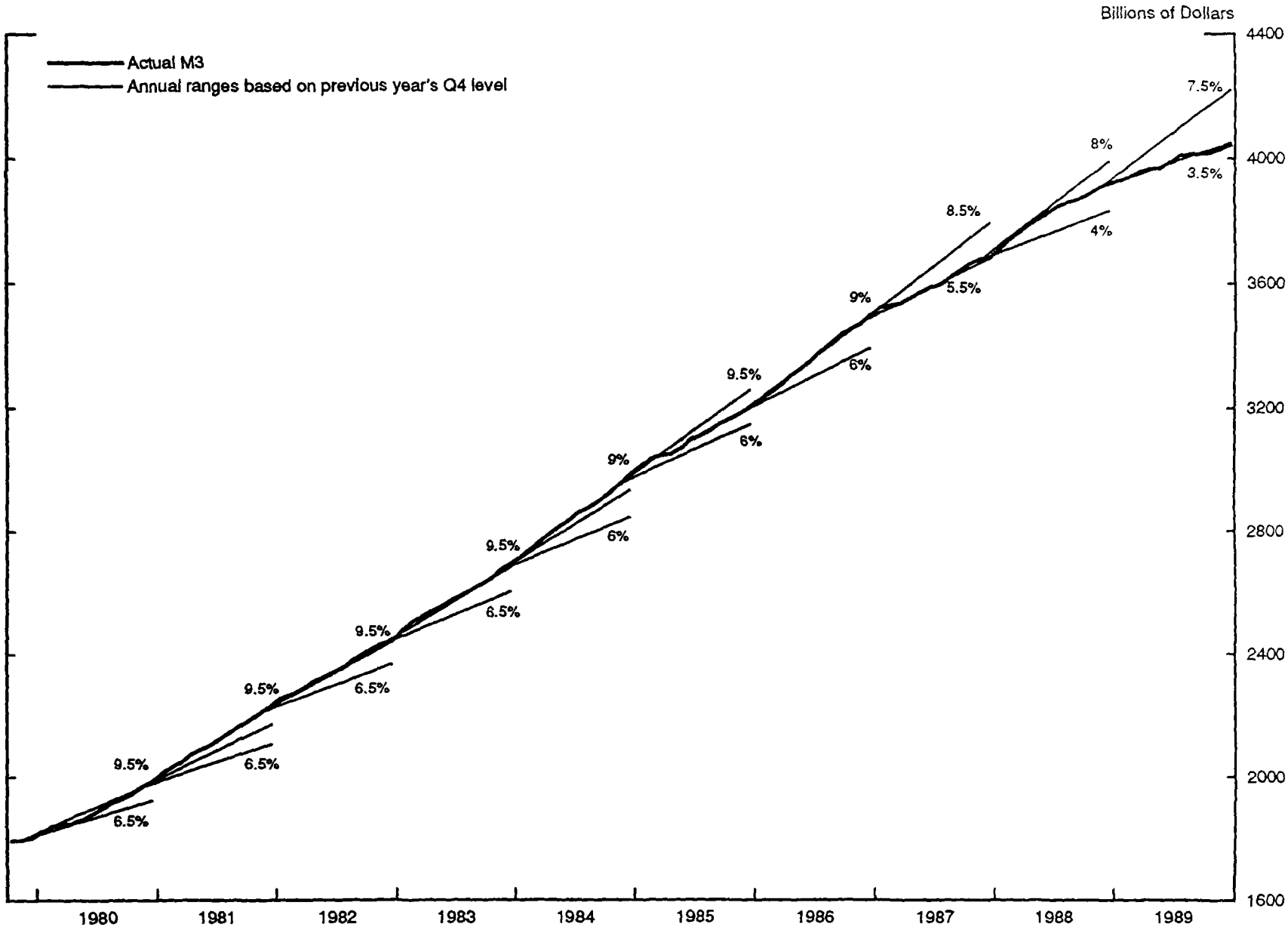
## M2 and Historical Ranges
(monthly data)




Note: Data plotted are as of June 1990 and do not necessarily reflect data at the time the individual cones were chosen.
*Range for 1983 is based on the February and March average.

Chart 6

## M3 and Historical Ranges
(monthly data)

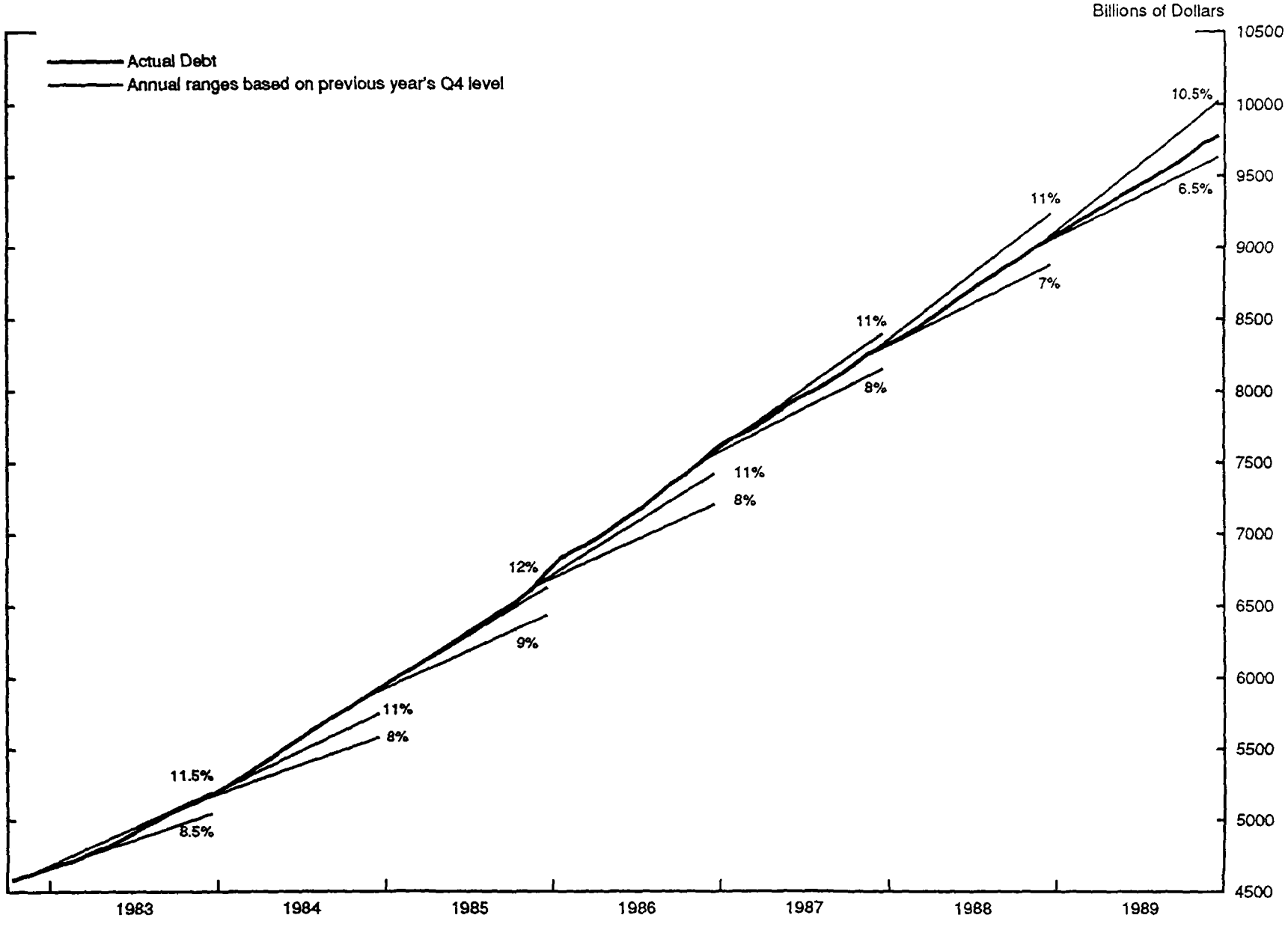



Note: Data plotted are as of June 1990 and do not necessarily reflect data at the time the individual cones were chosen.

Chart 7

## Domestic Nonfinancial Debt and Historical Ranges

(monthly data)




Note: Data plotted are as of June 1990 and do not necessarily reflect data at the time the individual cones were chosen.
Note: Previous to 1983 the FOMC targeted Bank Credit instead of Debt.

In 1988, the FOMC began to set four-percentage-point ranges in view of less predictable relationships between the aggregates and GNP.

Between 1980 and 1982, M2 finished each year at the upper end of its target range. In February 1983, the FOMC set a target range based on the February-March average in order to allow for the shifting of funds into newly-introduced MMDAs. M2 growth for the target period was 8.3 percent.

Since 1984, growth of M2 generally has been within or quite close to its target range on a fourth-quarter to fourth-quarter basis. The sole exception was in 1987, when M2 growth was 4.3 percent, significantly below the 5-1/2 to 8-1/2 percent target range for that year.[22] Growth of M2 has been puzzlingly slow this year, but at this time it appears fairly likely that the aggregate will finish the year within its range.[23]

In the early 1980s, M3 finished the year close to or above the upper end of its target range in most years. The largest divergence was in 1981, when M3 expanded 12.3 percent, compared with its 6-1/2 to 9-1/2 percent range. M3 growth substantially exceeded its range again in 1984, owing in part to strong demands for credit, stemming both from the economic recovery and from large net retirements of corporate equity.

This year, M3 expanded along the bottom edge of its 2-1/2 to 6-1/2 percent range through April and has declined on balance since then. This pattern has brought estimated growth through June to approximately

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22. The staff attributed the slow growth of M2 in 1987 partly to incentives created by the Tax Reform Act of 1986 for households to pay down consumer credit with liquid assets.
23. Factors recently influencing the monetary aggregates are discussed in greater detail in "Behavior of the Monetary Aggregates in the First Half of 1990", memorandum from the Division of Monetary Affairs to the Federal Open Market Committee, forthcoming, June 1990.

1-1/4 percent at an annual rate. Like M2, M3 no doubt has been heavily influenced by developments in the thrift industry, but no quantitative model is available to assess the impacts on this aggregate.

Unlike the monetary aggregates, domestic nonfinancial sector debt persistently exceeded its monitoring ranges between 1983 and 1987. From the supply side, the rapid pace of debt growth reflected a sharp pickup in issuance of federal sector debt as well as the rapid issuance of corporate debt that stemmed from retirements of equity as a result of mergers, acquisitions, leveraged buyouts, and financial restructurings. During this period, the FOMC clearly expected debt growth to be relatively rapid relative to GNP, but the extent of the overage was surprising.

Since 1986, debt has expanded well within the bounds of its annual ranges. This outcome has reflected slower growth of debt rather than upward adjustment of the ranges. In fact, the range for debt was lowered slightly in 1989 and was reduced further in 1990. So far this year, debt has expanded near the center of its 5 to 9 percent monitoring range.

In summary, the experience with ranges and actual outcomes does not suggest marked differences across aggregates in the Federal Reserve's ability to select ranges that will encompass outcomes, although the persistent overruns by the debt aggregate in the mid 1980s suggest that establishing ranges for this measure is somewhat more difficult than for the monetary aggregates.

CONSIDERATIONS FOR DETERMINING THE APPROPRIATE ROLES OF M3 AND DEBT

The statistical properties of the aggregates discussed above do not uniformly favor any one aggregate, although they certainly cast

doubt on the usefulness of debt in isolation. Data on debt are less timely than data on the aggregates, but the publication lag per se is probably not a decisive factor. The lack of weekly data on debt is not a serious issue. The one-month delay between the availability of monthly monetary data and monthly debt data makes debt somewhat less useful. A more important consideration is that the underlying source data are of questionable reliability and are infrequently available. Consequently, the monthly series must lean heavily on estimates, and thus the monthly availability of the debt figures is somewhat illusory.

M2 growth rates are more volatile than either M3 or debt growth and almost certainly more volatile than underlying GNP growth[24]. This volatility suggests that monetary policymakers need to "smooth" M2 data somewhat more than data on M3 and debt in order to assess underlying trends in the series. The substantial fraction of the variance of M2's growth that appears to be "noise" rather than a signal about movements in the economy similarly indicates that policy should be quite cautious about reacting to short-term swings in M2.

The empirical evidence on the marginal information contributed by the non-M2 component of M3 and by debt indicates that, once M2 is accounted for, the other aggregates add little. Moreover, the conceptual foundations for M3 and debt are not as firm as they are for M2, leading to difficulties in explaining and projecting these aggregates.

However, the difficulties associated with M3 and debt do not necessarily imply that the FOMC should drop them and set a range only

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24. Testing this supposition is not possible owing to the absence of high frequency data on GNP.

for M2. Establishing a range only for M2 could be a disadvantage to monetary policy because of the volatility of that aggregate and the occasional breakdowns in its association with GNP. Targeting only M2 would tend to heighten expectations on the part of the public and the Congress that the Federal Reserve would act to keep growth of that aggregate within its range. Experience suggests that the FOMC periodically would be faced with a choice between undesirable economic outcomes and violation of the target range. Missing the single monetary policy target could well have an adverse effect on Federal Reserve credibility and inflation expectations. On the other hand, in view of M2's long-run association with prices, setting a range for that aggregate alone could assist the Federal Reserve in achieving its long-run objectives, partly by enhancing its credibility and reducing the costs of eliminating inflation.

Assessments of the reliability of M2 suggest that fairly often circumstances arise when structural changes in the economy and financial system have a definite--if at the time unpredictable--effect on the demand for M2 and presumably on the M2-GNP relationship. For example, the slow growth of M2 in 1987 appears to have been in important part a result of changes in the tax law--and failed to provide an obvious signal about strong aggregate demand pressures. Another example is early 1983, when the authorization of money market deposit accounts led to very rapid growth of M2. M3 in contrast showed no significant acceleration. Recent experience provides yet another example. In 1990 both of the monetary aggregates clearly are being affected by the contraction in the thrift industry, independent of economic developments as a whole.

In these circumstances, the continued steady growth of domestic non-financial sector debt is a useful tool for explaining to the Congress and the public that concerns about credit availability may be exaggerated. These episodes suggest that while M2 may on average be a better indicator of economic developments than the other aggregates, circumstances occasionally arise when it is worse.[25]

Legal Requirements for Monetary and Credit Ranges[26]

Finally, there is an issue as to the legal requirements for establishing target ranges for money and credit. In 1987, Senator Proxmire, Chairman of the Committee on Banking, Housing and Urban Affairs, requested an opinion of the Board's general counsel on the issue of whether the the Board is required by section 2A of the Federal Reserve Act to submit a target range for M1 as part of its semiannual monetary policy report to Congress. The general counsel concluded that the law does not require the Federal Reserve to report its "objectives and plans" for any specific monetary aggregate for which the Federal Reserve has not formulated any particular objectives or plans.[27] Thus, the Board was not required to submit its plans for M1. The same reasoning developed in that opinion would seem to apply equally to M3, if the FOMC determined that it would not formulate objectives or plans for that aggregate.

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25. As noted above, the 1987 study for the FOMC suggested that rigidly targeting M2 alone, ignoring other information on the economy, could lead to undesirably large deviations of ultimate economic variables, such as prices and income, from the FOMC's objectives. Although this study assumed rigid targeting of M2--which is not being proposed in the current circumstances--it nevertheless casts doubt on the reliability of M2 in achieving economic objectives over short- and intermediate-length periods.
26. Incorporates comments made by J. Virgil Mattingly.
27. Michael Bradfield, Memorandum on Humphrey-Hawkins Act Reporting Requirements, April 2, 1987.

Complete elimination of a range for credit presents a more difficult question. A literal reading of the statue would lead to the conclusion that if the FOMC established no plan or objective for a credit aggregate, no report would be required. On the other hand, there is a clear expectation in the legislative history that the FOMC would establish and report objectives for credit. During hearings on the legislation, Chairman Burns requested that the proposal be modified to include a credit aggregate on the basis that Congress would be "interested in the credit supply." Given this background, if the FOMC were to decide not to set a range for credit, that determination would have to be made, and explained to the Congress, on the basis of an exceptionally persuasive argument that the establishment of such a range would not be useful.[28]

28. It is quite clear that the Federal Reserve has some latitude in choosing an appropriate measure of credit to report to the Congress. As noted previously, prior to 1983 the FOMC established ranges for bank credit rather than for domestic nonfinancial sector debt.