Review

Vol. 67, No. 6 June/July 1985

THE FEDERAL RESERVE BANK of ST. LOUIS

The Review *is published 10 times per year by the Research and Public Information Department of the Federal Reserve Bank of St. Louis. Single-copy subscriptions are available to the public free of charge. Mail requests for subscriptions, back issues, or address changes to: Research and Public Information Department, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, Missouri 63166.*

Federal Reserve Bank of St. Louis
Review
June/July 1985

In This Issue . . .

The federal government in its February 1985 budget announced cuts of about $507 billion relative to current services estimates for the 1986–90 period. In the first article of this *Review*, "Controlling Federal Outlays: Trends and Proposals," Keith M. Carlson assesses the significance of these proposed reductions by comparing them with some longer-term trends in federal outlays. He concludes that, while attempts to cut the proportion of total federal outlays to GNP have been unsuccessful thus far, the administration's proposals, if achieved, would reduce outlays relative to GNP. Historical comparisons show, however, that the mix of outlays between defense and nondefense has been altered quite dramatically, and a continuation of this reversal is proposed for the future.

* * *

In the second article in this issue, "The Monetary Control Act, Reserve Taxes and the Stock Prices of Commercial Banks," G. J. Santoni shows that the reserve requirements imposed on financial institutions have the properties of a tax. With the aid of some simple examples, the author demonstrates that this reserve tax varies with the interest rate and, prior to 1980, had differential effects on the earnings streams and capital values of banks. These differential tax effects are important. Equity considerations aside, they artificially raise the operating cost of some firms relative to others engaged in essentially the same business. This distorts the rates of production among the differentially taxed firms and lowers the value of output for given costs.

Santoni discusses an important change in the tax embodied in the Monetary Control Act of 1980. Specifically, the act raised reserve requirements for firms that are not members of the Federal Reserve System while lowering them for member banks. The paper shows that the more uniform reserve requirements have significantly reduced the differential effect of interest rate changes on the stock prices of these two types of banks. The legislation has raised the after-tax earnings streams and stock prices of member banks, other things the same, while lowering both for nonmember banks.

* * *

In the early 1980s, the FDIC became concerned about a lack of market discipline imposed by large depositors on the risks assumed by banks. The FDIC has attempted to promote greater market discipline by allowing the uninsured depositors of some failed banks to suffer losses. There is some evidence, however, of a double standard in these actions: the cases in which uninsured depositors have been exposed to losses involve relatively small banks, whereas the uninsured depositors of the Continental Illinois Bank were protected from losses by the FDIC in May of last year.

In the third article in this *Review*, "Recent Changes in Handling Bank Failures and their Effects on the Banking Industry," R. Alton Gilbert investigates whether the FDIC's actions have induced uninsured depositors to shift their accounts to the relatively large banks that appear to be too large to be allowed to fail. There is no evidence of a shift of uninsured deposits from small to large banks. Instead,

there has been a small rise in the share of large-denomination time deposits at relatively small banks in the past year.

* * *

The introduction of new financial instruments and recent financial deregulation have obfuscated the distinction between money and near-money assets. One response to this situation has been the introduction of weighted monetary aggregates, the construction of which attempts to extract the monetary services provided by assets. In the final article of this issue, "Are Weighted Monetary Aggregates Better Than Simple-Sum M1?" Dallas S. Batten and Daniel L. Thornton investigate the properties of two weighted monetary aggregates and compare these with the measure M1. Influencing economic activity is a central objective of monetary policy, so an important attribute for a monetary aggregate to possess is a close, predictable relationship with economic activity. The evidence, however, indicates that the relationship between the two weighted measures and economic activity, as measured by nominal GNP, has been no more predictable or less variable than the relationship between M1 and GNP. Consequently, these weighted aggregates do not demonstrate any apparent gain over M1 that can be exploited for monetary policy purposes.

Controlling Federal Outlays: Trends and Proposals

Keith M. Carlson

IN his February 1985 budget message, President Reagan noted that

> The past 4 years have also seen the beginning of a quiet but profound revolution in the conduct of our Federal Government. We have halted what seemed at the time an inexorable set of trends toward greater and greater Government intrusiveness, more and more regulation, higher and higher taxes, more and more spending, higher and higher inflation, and weaker and weaker defense.[1]

Yet, federal outlays as a proportion of GNP were still half a percentage point above what they were when the administration took office in 1981.

The purpose of this article is to summarize recent trends in federal outlays and assess the administration's future plans by placing them in a historical context.[2] The focus of the discussion is on the behavior of federal outlays as a percent of GNP — a measure that was used initially by the administration to summarize the government's influence on the economy.

BUDGET OUTLAYS VS. CURRENT SERVICES

Interpreting budget trends requires some reference measure that can be used for comparison. The reference measure used in the February 1985 budget is the "current services budget." According to the budget document, "current services" estimates are defined as

> . . . the estimated budget outlays and proposed budget authority that would be included in the budget for the following fiscal year if programs and activities of the United States Government were carried on during that year at the same level as the current year without a change in policy.[3]

Current services estimates "provide a base against which budgetary alternatives may be assessed."[4]

Table 1 summarizes both the administration's 1985 proposals and the current services estimates for 1985 through 1990.[5] A comparison of the figures indicates that the administration plans to cut federal outlays by $507 billion between 1986 and 1990, with the largest cuts coming in the last three years. When converted to percentages, the cuts range from 5 percent in 1986 to 10.7 percent in 1990.

The bottom half of table 1 shows the current services and proposed budget estimates as percentages of GNP. The proposed estimates represent sizable decreases in the proportion of federal government outlays to GNP compared with the current services estimates.

Whether such proposed reductions in the proportion of federal outlays relative to GNP will actually

---

Keith M. Carlson is an assistant vice president at the Federal Reserve Bank of St. Louis. Thomas A. Pollmann provided research assistance.

[1]Office of Management and Budget (1985a).

[2]Even though the administration's February 1985 proposals will not be realized, these proposals provide a base for debate by Congress whereby modifications will be made.

[3]Office of Management and Budget (1985b), p. A-1.

[4]Ibid, p. A-2.

[5]For alternative estimates of both the administration's program and current services, see Congressional Budget Office (1985).

Table 1

Federal Outlays: Budget Estimates vs. Current Services, February 1985

	1985	1986	1987	1988	1989	1990
In Billions of Dollars						
Current services	$960.4	$1024.5	$1109.2	$1200.0	$1262.8	$1332.8
Budget estimates	959.1	973.7	1026.6	1094.8	1137.4	1190.0
Difference	$1.3	$50.8	$82.6	$105.2	$125.4	$142.8
				$506.8		
Percent difference	0.1%	5.0%	7.5%	8.8%	9.9%	10.7%
As a Percent of GNP						
Current services	24.8%	24.4%	24.4%	24.4%	23.8%	23.4%
Budget estimates	24.8	23.2	22.6	22.2	21.4	20.9
Difference	0.0%	1.2%	1.8%	2.2%	2.4%	2.5%

NOTE: All figures include off-budget outlays.

occur depends crucially on both political considerations and future economic conditions — neither of which can be forecast with much reliability.[6] One way to assess the significance of the proposed reductions, however, is to compare them with some longer-term trends in federal outlays. In this manner, it is at least possible to see what such reductions would mean in a historical context.

BUDGET OUTLAYS AS A PERCENT OF GNP: A HISTORICAL PERSPECTIVE

To examine properly federal outlays relative to GNP from a historical perspective requires adjusting outlays and GNP separately for the direct influence of the business cycle.[7] Since federal outlays generally rise relative to GNP during recessions, the inclusion of such percentages without adjustment could distort the interpretation of underlying trends.

Total Outlays

The historical record of cyclically adjusted federal outlays as a percent of adjusted GNP is summarized in chart 1. Even with cyclical adjustment, this measure of government activity is still quite volatile, especially on a year-to-year basis. Consequently, a trend line for the period 1956–81 has been plotted in the chart.

Extending the trend line from 1982 through 1990 indicates that the administration has not been successful in reducing total outlays as a percent of GNP in the 1981–84 period. Moreover, the proposed 1985 level of outlays is well above the historical trend.

Chart 1 does show that the administration is proposing a path of outlays after 1985 that differs dramatically from both the 1956–81 trend and its first four years in office. If the administration's proposals are enacted, the size of government would be reduced to that prevailing in the mid-1970s.

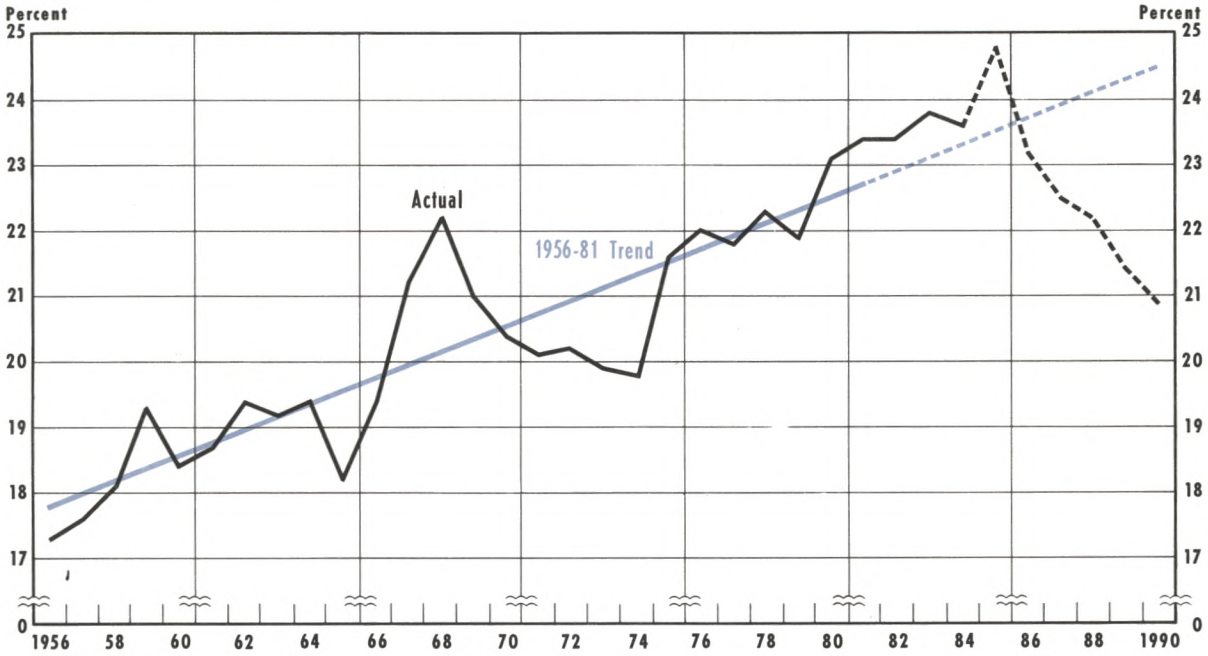
The Composition of Total Outlays

An examination of total budget outlays relative to GNP masks the contrasting differences taking place between defense and nondefense outlays. Chart 2 summarizes these outlays relative to GNP. Nondefense outlays and GNP are adjusted for the business cycle; defense outlays are not adjusted because they are not systematically related to the business cycle. The defense portion of the chart shows the downward trend

[6]See Carlson (1983).

[7]Federal outlays were adjusted for the cycle using correction factors implicit in the work by de Leeuw and Holloway (1983). This meant adjusting budget outlays in the same proportion as national income accounts federal expenditures are adjusted to derive cyclically adjusted expenditures. Following this procedure captures only the automatic response of federal outlays to the business cycle, meaning that countercyclical fiscal actions are still reflected in the figures. Trend GNP is middle-expansion trend GNP as defined by de Leeuw and Holloway. See also Holloway (1984).

Chart 1
Total Budget Outlays as a Percent of GNP



NOTE: Total budget outlays and GNP are cyclically adjusted.

of defense outlays relative to GNP from 1956 to 1981. Since 1981, the trend has been reversed, with defense spending rising to 6.3 percent of GNP in 1984. The administration plans for future defense spending to continue to rise relative to GNP; the proposed budget calls for defense outlays to reach 7.5 percent of GNP by 1990.[8]

The nondefense portion of the chart shows that the growth of cyclically adjusted nondefense outlays relative to trend GNP was extraordinarily rapid from 1956 to 1981. Such spending rose from 6.9 percent of GNP in 1956 to 18 percent in 1981. Since 1981, however, the ratio of nondefense outlays to GNP has been reduced relative to its 1956–81 trend.

The administration plans for the reduction in nondefense outlays relative to GNP to continue; these reductions are quite dramatic relative to the 1956–81 trend. The administration's proposals call for nondefense outlays to be reduced to 13.4 percent of GNP by 1990. If realized, the relative size of the nondefense budget would be reduced to levels prevailing in the early 1970s.

The Composition of Nondefense Outlays

Chart 3 summarizes nondefense spending by major program category and emphasizes the method of carrying out government activities. The purpose of looking at these categories is to determine where the nondefense budget cuts will fall.[9]

The largest proportion of nondefense spending, given this set of categories, is payments for individuals. This category includes both direct (for example, Social Security benefits) and indirect (via grants to state and local governments, such as Medicaid and assistance payments) transfer payments by the federal government. According to the top tier of chart 3, this spending grew rapidly from 1956 to 1981; its trend has apparently been reversed since 1983. The administra-

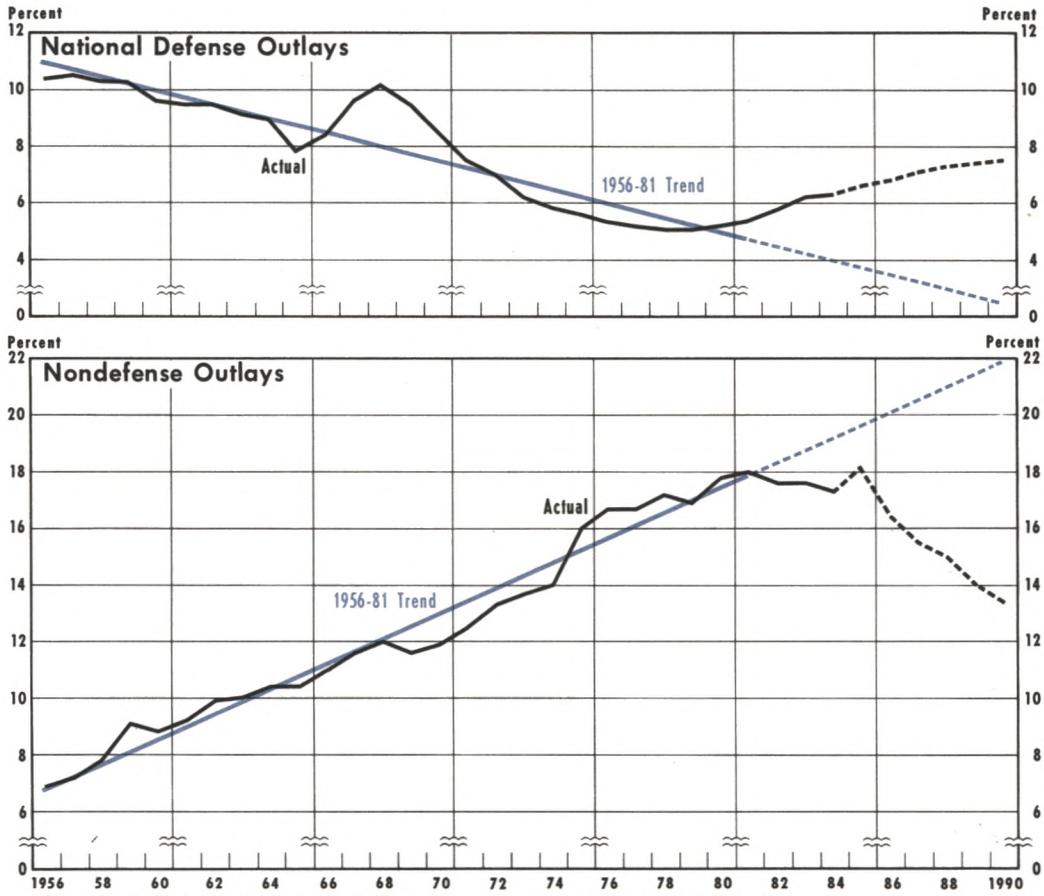
[8]The administration indicates that its proposed defense outlays will be less than the current services estimates (see the appendix to this article for 1990 estimates). The Congressional Budget Office disputes this contention, claiming that the administration's defense proposals are greater than current services estimates. See Congressional Budget Office (1985), p. 22.

[9]For further detail relative to current services estimates, see the appendix.

Chart 2

Composition of Total Budget Outlays

Percent of GNP



NOTE: Nondefense outlays and GNP are cyclically adjusted. Nondefense outlays include undistributed offsetting receipts.

tion plans to continue to reduce such payments relative to GNP to 9.8 percent by 1990, a dramatic departure from its growth over the 1956–81 period.

The category labeled "all other grants" includes all grants to state and local governments except transfer payments. Included in this category are grants for wastewater treatment plants, highway construction, community development, education, employment and training assistance, and general revenue sharing. The second tier of chart 3 indicates that this category of spending has been reduced well below the 1956–81 trend line in recent years. The extent of the cut is dramatic — from a peak of 2.6 percent of GNP in 1978 to 1.5 percent in 1984. Furthermore, this category is projected for further cuts in the future, to 0.9 percent of GNP in 1990.

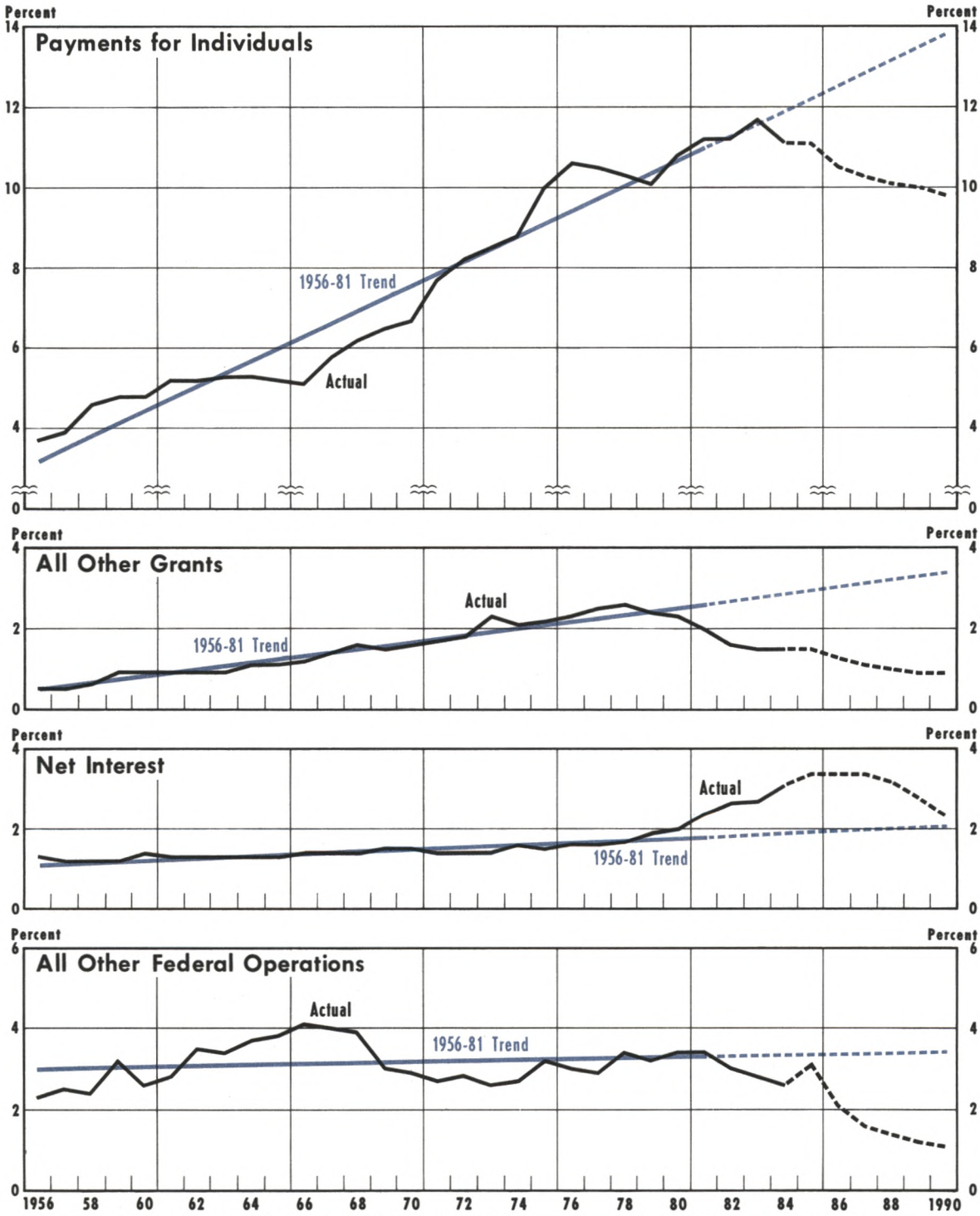
The net interest category has attracted considerable attention in recent years. Once a relatively insignificant part of the budget, it has risen considerably to the point where policymakers now view it with major concern.[10] The third tier of chart 3 shows that, after rising from 1.3 percent of GNP in 1956 to 1.6 percent in 1976, net interest rose steadily to 3.1 percent of GNP in 1984. Projections of net interest depend on a number of factors, the most important of which is the future course of deficits and the projected level of interest

[10]This is because of the cumulative effect of net interest. Higher net interest adds to the current deficit, which carries over to future years in the form of a larger debt that must be financed. See Carlson (1984).

Chart 3

Composition of Nondefense Outlays

Percent of GNP



NOTE: GNP and payments for individuals are cyclically adjusted. All other federal operations does not include undistributed offsetting receipts.

rates. Given the administration's overall plan for reducing the size of the deficit and a projected decline in interest rates, net interest outlays as a percent of GNP is projected to continue rising through 1985, level off for two years, then drop sharply to 1990; however, it will still remain above the 1956–81 trend as extrapolated to 1990.

The "all other federal operations" category includes outlays for foreign aid, general science research and space technology, energy programs, farm price supports, housing credit activities and day-to-day operations of the government. Relative to GNP, as shown in the bottom tier of chart 3, this category of nondefense outlays displayed a slight upward trend during the 1956–81 period; it has declined in recent years. The jump in the estimate for fiscal year 1985 reflects primarily the surge in outlays related to the PIK farm program. The administration plans to continue to cut such outlays as a percent of GNP through 1990. Such proposed cuts are centered on farm price support programs, foreign aid and loan activities of the government.

SUMMARY

The federal government in its February 1985 budget announced cuts of about $507 billion relative to current services estimates for the 1986–90 period. These proposed cuts were compared with recent trends in federal outlays relative to GNP since 1956; the results of these comparisons are summarized in table 2. The historical record indicates that, while attempts to cut the proportion of total federal outlays to GNP have been unsuccessful thus far, the administration's current proposals, if achieved, would reduce outlays relative to GNP. The historical comparisons show the present administration has altered the mix of total outlays between defense and nondefense quite dramatically, and a continuation of this reversal is proposed for the future.

Payments for individuals are scheduled to be cut moderately relative to GNP for each year after 1985. Net interest as a percent of GNP, which is currently climbing well above past trends, is projected to continue rising through 1985, level off, then move back toward trend after 1987. Budget cuts, as measured by outlays relative to GNP, are concentrated in "all other grants to state and local governments" and in "all other federal operations." The government's program is ambitious: in order to reduce total budget outlays to 20.9 percent of GNP by 1990, while at the same time increasing defense outlays to 7.5 percent of GNP, nondefense outlays will have to be reduced to 13.4 percent of GNP from the current level of approximately 18 percent.

Table 2
Summary of Trends

	Relation to 1956–81 trend[1]	
Percent of GNP	**1982–84**	**1985–90**
Total budget outlays	Above	Below
National defense	Above	Above
Nondefense	Below	Below
Payments for individuals	Below	Below
All other grants	Below	Below
Net interest	Above	Above
All other federal operations	Below	Below

[1]A straight line trend was fitted to the relevant measure of outlays as a percent of GNP.

REFERENCES

Carlson, Keith M. "The Critical Role of Economic Assumptions in the Evaluation of Federal Budget Programs," this *Review* (October 1983), pp. 5–14.

_____. "Money Growth and the Size of the Federal Debt," this *Review* (November 1984), pp. 5–16.

Congressional Budget Office. *An Analysis of the President's Budgetary Proposals for Fiscal Year 1986* (February 1985).

de Leeuw, Frank, and Thomas M. Holloway. "Cyclical Adjustment of the Federal Budget and Federal Debt," *Survey of Current Business* (December 1983), pp. 25–40.

Holloway, Thomas M. *Cyclical Adjustment of the Federal Budget and Federal Debt: Detailed Methodology and Estimates*, Bureau of Economic Analysis Staff Paper 40 (U.S. Department of Commerce, June 1984).

Office of Management and Budget. *Budget of the United States Government: Fiscal Year 1986* (February 1985a), p. M4

_____. *Special Analysis: Budget of the United States Government: Fiscal Year 1986* (February 1985b).

APPENDIX: Composition of Federal Outlays

Federal outlays can be classified in terms of two analytical structures: budget function and major program category. The functional classification presents outlays according to the purposes that federal pro-

Table A1

1990 Federal Outlays: Current Services vs. Administration Proposals (amounts in billions of dollars)

Category	Current services	Administration proposal	Difference	Percent difference
National defense	$441.7	$428.6	$−13.1	−3.0%
Benefit payments for individuals[1]	590.6	555.0	−35.6	−6.0
Health	48.9	40.8	−8.1	−16.6
Social Security and Medicare	369.2	355.4	−13.8	−3.7
Income security	140.8	130.6	−10.2	−7.2
Veteran payments	31.7	28.2	−3.5	−11.0
Other grants to state and local governments[1]	61.2	43.9	−17.3	−28.3
National resources and environment[2]	3.5	2.7	−0.8	−22.9
Transportation[2]	22.2	16.8	−5.4	−24.3
Community and regional development[2]	5.7	3.8	−1.9	−33.3
Education, training, employment and social services[2]	22.7	18.7	−4.0	−17.6
General purpose fiscal assistance	7.1	1.9	−5.2	−73.2
Net interest	164.2	137.7	−26.5	−16.1
Other federal operations[1]	117.3	69.9	−47.4	−40.4
International affairs	19.5	14.5	−5.0	−25.6
General service, space and technology	11.0	11.1	0.1	0.9
Energy	6.1	2.3	−3.8	−62.3
Natural resources and environment[2]	9.3	7.3	−2.0	−21.5
Agriculture	20.1	3.8	−16.3	−81.1
Commerce and housing credit	3.8	−3.7	−7.5	−197.4
Transportation[2]	10.0	7.6	−2.4	−24.0
Community and regional development[2]	2.5	1.7	−0.8	−32.0
Education, training, employment and social services[2]	11.6	9.5	−2.1	−18.1
Administration of justice	7.4	6.9	−0.5	−6.8
General government	6.1	4.9	−1.2	−19.7
Allowances	9.9	4.0	−5.9	−59.6
Undistributed offsetting receipts	−42.1	−45.0	−2.9	—

[1]Amounts shown are the sums for the functions listed under them, and differ slightly from the "major program category" amounts shown in the budget.

[2]The budget gives current services estimates for the total. Estimates by major program category were estimated by the author.

grams are intended to serve. These functions are grouped into 18 broad areas, including, for example, national defense, international affairs, energy programs, agriculture, transportation, health and general government programs. Three additional categories — net interest, allowances and undistributed offsetting receipts — do not address specific functions, but are included to cover the entire budget.

Classification of federal outlays by major program category focuses on the method of carrying out an activity. The major program categories are national defense, benefit payments to individuals, grants to state and local governments (other than for benefit payments), net interest, other federal operations and undistributed offsetting receipts. National defense, net interest, and undistributed offsetting receipts correspond to the functional categories of the same name, but, the remaining major program categories do not correspond to a simple summing of functional categories. Nonetheless, approximations can be made. The accompanying table groups 1990 outlays by function to show the approximate composition of some of the major program categories.

The Monetary Control Act, Reserve Taxes and the Stock Prices of Commercial Banks

G. J. Santoni

SINCE 1980 all depository institutions have been required to hold reserve balances in the form of Treasury coins and Federal Reserve notes either in their own vaults or on deposit at their regional Federal Reserve Banks. These reserve balances pay no interest, so the foregone interest earnings on the investments the firm could otherwise have made can be viewed as a tax.[1]

This tax lowers the firm's expected stream of future income net of taxes which, other things the same, reduces the capital value of the firm. The tax varies with the general level of interest rates as well as the spread between bank lending and borrowing rates. Prior to 1980, the tax had differential effects across banks depending on the tax rate (required reserve ratio) faced by these various firms. This was particularly true with respect to member vs. nonmember banks of the Federal Reserve System.[2] These differential tax effects are important. Equity considerations aside, they artificially raise the operating costs of some firms relative to others engaged in essentially the same business activity. This distorts rates of production and the allocation of resources among the differentially taxed firms and lowers the value of output for given costs.

The Monetary Control Act of 1980 imposed uniform reserve requirements on all depository institutions by raising reserve requirements for nonmember banks, while lowering them for member banks. The purpose of this article is to analyze the effect this legislation has had in eliminating the differential tax effect of interest rate changes on member vs. nonmember banks. In particular, the paper examines whether the act was effective in revising the response of bank capital values (stock prices) to interest rate changes. Since any revision in differences in tax rates between groups generally benefits one group over another, the paper provides some rough estimates of this as well.

RESERVE REQUIREMENTS: PRE-1980

Prior to the Monetary Control Act, reserve requirements for nonmember banks were set by the various state banking authorities. These differed across states with respect to the reserve ratio, the form in which the reserves were required to be held, the method and frequency of policing and the penalty imposed for deficiency.[3] While differences existed, the reserve requirements of state banking authorities generally were more lenient than those of the Federal Reserve System. This appears to have been so with respect to the form of the reserves, policing and penalties for deficiency.[4]

Specifically, 30 of the 50 state banking authorities allowed banks to hold at least a portion of their reserves in interest-earning assets, 36 states did not require periodic reporting of reserve and deposit balances and 22 had no monetary penalty for deficient banks.[5] In contrast, Fed members had to hold reserves either in their vaults or on deposit at a Federal Reserve Bank. These reserve balances earned no interest. Member banks reported their deposit and reserve balances to the Fed on a weekly basis, and a monetary penalty was enforced for deficient banks.

The left side of table 1 gives the reserve require-

G.J. Santoni is a senior economist at the Federal Reserve Bank of St. Louis. *Thomas A. Pollmann provided research assistance. This paper was produced in conjunction with the Center for Banking Research at Washington University in St. Louis and appears in the working paper series published by that institution.*

[1]For discussions of the effects of differential reserve requirements, see Fama (1985); Cargill and Garcia (1982); Gilbert (1978); Gilbert and Lovati (1978); Prestopino (1976); Goldberg and Rose (1976) and Knight (1974).

[2]See Goldberg and Rose (1976) and Prestopino (1976).

[3]See Gilbert and Lovati (1978), Prestopino (1976) and Knight (1974).

[4]See Gilbert and Lovati (1978), p. 32, and Knight (1974), p. 12–13, for listings of the various state requirements.

[5]Seven states imposed reserve requirements that were roughly identical to those of Fed members. These states were Arkansas, California, Kansas, Nevada, New Jersey, Oklahoma and Utah. Nonmember banks in these states are excluded from the data sample in the tests conducted below.

Table 1: **Depository Institutions' Reserve Requirements (percent of deposits)**[1]

Type of deposit and deposit interval (millions of dollars)	Member bank requirements before implementation of the Monetary Control Act: Percent	Effective date
Net demand [2]		
$ 0– 2	7 %	12/30/76
2– 10	9 1/2	12/30/76
10–100	11 3/4	12/30/76
100–400	12 3/4	12/30/76
Over 400	16 1/4	12/30/76
Time and savings[2,3,4]		
Savings	3 %	3/16/67
Time[5]		
0–5, by maturity		
30–179 days	3 %	3/16/67
180 days to 4 years	2 1/2	1/8/76
4 years or more	1	10/30/75
Over 5, by maturity		
30–179 days	6	12/12/74
180 days to 4 years	2 1/2	1/8/76
4 years or more	1	10/30/75

Type of deposit, and deposit interval (millions of dollars)	Depository institution requirements after implementation of the Monetary Control Act[6]: Percent	Effective date
Net transaction accounts [7]		
$0–$29.8	3%	1/1/85
Over $29.8	12	1/1/85
Nonpersonal time deposits [8]		
By original maturity		
Less than 4 years	3%	10/6/83
4 years or more	0	10/6/83
Eurocurrency liabilities		
All types	3%	11/13/80

SOURCE: *Federal Reserve Bulletin,* November 1980, p. A8.

[1]For changes in reserve requirements beginning 1963, see Board's *Annual Statistical Digest, 1971-1975* and for prior changes, see Board's *Annual Report* for 1976, table 13. Under provisions of the Monetary Control Act, depository institutions include commercial banks, mutual savings banks, savings and loan associations, credit unions, agencies and branches of foreign banks, and Edge Act corporations.

[2](a) Requirement schedules are graduated, and each deposit interval applies to that part of the deposits of each bank. Demand deposits subject to reserve requirements are gross demand deposits minus cash items in process of collection and demand balances due from domestic banks.

(b) The Federal Reserve Act as amended through 1978 specified different ranges of requirements for reserve city banks and for other banks. Reserve cities were designated under a criterion adopted effective November 9, 1972, by which a bank having net demand deposits of more than $400 million was considered to have the character of business of a reserve city bank. The presence of the head office of such a bank constituted designation of that place as a reserve city. Cities in which there were Federal Reserve Banks or branches were also reserve cities. Any banks having net demand deposits of $400 million or less were considered to have the character of business of banks outside of reserve cities and were permitted to maintain reserves at ratios set for banks not in reserve cities.

(c) Effective August 24, 1978, the Regulation M reserve requirements on net balances due from domestic banks to their foreign branches and on deposits that foreign branches lend to U.S. residents were reduced to zero from 4 percent and 1 percent, respectively. The Regulation D reserve requirement on borrowings from unrelated banks abroad was also reduced to zero from 4 percent.

(d) Effective with the reserve computation period beginning November 16, 1978, domestic deposits of Edge corporations were subject to the same reserve requirements as deposits of member banks.

[3]Negotiable order of withdrawal (NOW) accounts and time deposits such as Christmas and vacation club accounts were subject to the same requirements as savings deposits.

[4]The average reserve requirement on savings and other time deposits at that time had to be at least 3 percent, the minimum specified by law.

[5]Effective November 2, 1978, a supplementary reserve requirement of 2 percent was imposed on large time deposits of $100,000 or more, obligations of affiliates and ineligible acceptances. This supplementary requirement was eliminated with the maintenance period beginning July 24, 1980. Effective with the reserve maintenance period beginning October 25, 1979, a marginal reserve requirement of 8 percent was added to managed liabilities in excess of a base amount. This marginal requirement was increased to 10 percent beginning April 3, 1980, was decreased to 5 percent beginning June 12, 1980, and was reduced to zero beginning July 24, 1980. Managed liabilities are defined as large time deposits, Eurodollar borrowings, repurchase agreements against U.S. government and federal agency securities, federal funds borrowings from nonmember institutions and certain other obligations. In general, the base for the marginal reserve requirement was originally the greater of (a) $100 million or (b) the average amount of the managed liabilities held by a member bank, Edge corporation, or family of U.S. branches and agencies of a foreign bank for the two statement weeks ending September 26, 1979. For the computation period beginning March 20, 1980, the base was lowered by (a) 7 percent or (b) the decrease in an institution's U.S. office gross loans to foreigners and gross balances due from foreign offices of other institutions between the base period (September 13-26, 1979) and the week ending March 12, 1980, whichever was greater. From the computation period beginning May 29, 1980, the base was increased by 7-1/2 percent above the base used to calculate the marginal reserve in the statement week of May 14-21, 1980. In addition, beginning March 19, 1980, the base was reduced to the extent that foreign loans and balances declined.

[6]For existing nonmember banks and thrift institutions, there is a phase-in period ending September 3, 1987. For existing member banks the phase-in period is about three years, depending on whether their new reserve requirements are greater or less than the old requirements. For existing agencies and branches of foreign banks, the phase-in ended August 12, 1982. All new institutions will have a two-year phase-in, beginning with the date that they open for business.

[7]Transaction accounts include all deposits on which the account holder is permitted to make withdrawals by negotiable or transferable instruments, payment orders of withdrawal, telephone and preauthorized transfers (in excess of three per month), for the purpose of making payments to third persons or others.

[8]In general, nonpersonal time deposits are time deposits, including savings deposits, that are not transaction accounts and in which the beneficial interest is held by a depositor which is not a natural person. Also included are certain transferable time deposits held by natural persons and certain obligations issued to depository institution offices located outside the United States. For details, see section 204.2 of Regulation D.

NOTE: Required reserves must be held in the form of deposits with Federal Reserve Banks or vault cash. After implementation of the Monetary Control Act, nonmembers may maintain reserves on a pass-through basis with certain approved institutions.

Table 2

Member Bank Foregone Interest on Reserve Balances (millions of dollars)

Net Demand	Required Reserves	Foregone Interest When i = .08[1]
$ 0	$ 0.00	$ 0.000
2	0.14	0.011
10	0.90	0.072
25	2.66	0.213
100	11.48	0.918
400	50.00	4.000
1,000	147.50	11.800
2,000	310.00	24.800
5,000	797.50	63.800

[1]Foregone interest = i × required reserves

ments that applied to Federal Reserve member banks before November 1980.[6] These reserve ratios were at least as high as those imposed by the various state banking authorities for nonmember banks and, in most cases, they were higher.[7]

THE MEMBERSHIP TAX: PRE-1980

Other things the same, the more stringent reserve requirements for Fed members raised the cost of maintaining a given level of deposits relative to the cost experienced by nonmembers. Table 2 uses the data in table 1 to calculate the tax for member banks at various levels of net demand deposits.[8] For example, a member bank with $100 million in net demand deposits was required to hold $11.48 million in reserves. This resulted in foregone earnings of $918,000 per year if the market rate were 8 percent.[9] The decline in the expected stream of earnings was the reserve tax (in this case, $918,000 per year). Since the capital value of a firm is the present value of its expected earnings stream, the tax reduced the capital value of the bank as well.

[6]The Monetary Control Act was passed in March 1980, but the new reserve requirements did not become effective immediately. The right side of the table indicates the reserve requirements that would have been imposed as of November 13, 1980, if there had been no phase-in period. In fact, these new requirements were phased in over a period of years (see table 1, note 6). For the moment, the discussion is focused on pre-November 1980 reserve requirements.

[7]See Gilbert and Lovati (1978) for a listing of the reserve ratios imposed by the various state authorities.

[8]The calculation is intended for illustrative purposes only and ignores the foregone interest on reserves held against time deposits.

[9]This represents an upper bound to the tax since the bank would maintain some reserves even if there were no legal requirement to do so.

RELATIVE CAPITAL VALUES AND THE INTEREST RATE

Not only does the reserve tax reduce the expected earnings streams and capital values of member banks (those with higher reserve requirements) relative to nonmember banks, but the earnings streams and capital values of member banks change relative to nonmember banks with changes in either the general level of interest rates or the spread between bank borrowing and lending rates.

A Change in the General Level of Interest Rates

Table 3 illustrates the effect of a change in the level of interest rates with the spread held constant. In panel A, the rate at which banks can lend is assumed to be 10 percent, while the rate paid on deposits (and other sources of funds) is 5 percent. The reserve requirement for member banks is assumed to be 10 percent. For illustrative purposes, the non-interest-earnings reserves of nonmembers are assumed to be zero. The table calculates the amount available for lending, the annual net revenue and the capital value of the net revenue stream for each $100 of deposits for both a member and a nonmember bank.

The reserve requirement lowers the amount that can be loaned, the stream of net revenue and capital value of the member relative to the nonmember bank. The capital value of the member's revenue stream is $40, while the nonmember's is $50. The member's capital value relative to the nonmember's is 80 percent. Notice that the absolute difference between the two capital values is equal to the required reserves of members ($50 − $40 = $10).

In panel B, both lending and borrowing rates are assumed to increase to 20 percent and 15 percent, respectively, while other things remain the same.[10] The net revenue stream of the nonmember does not change while the member's stream falls. The increase in interest rates causes the capital value of both banks to decline. More importantly, however, the capital value of the member bank drops from 80 percent to 60 percent in terms of the capital value of the nonmember bank.

Notice that, in this particular case, the absolute

[10]In the example, the absolute spread is unchanged but the relative spread (i_B/i_L) changes. If the ratio of the borrowing to the lending rate remained constant as the general level of interest rates changed, relative capital values would not change. The example is intended for illustrative purposes. A more precise statement of the effect of interest rate changes is given in the appendix.

Table 3

A Change in the General Level of Interest Rates and Relative Capital Values[1]

	Members	Nonmembers	Relative Capital Value
Panel A: Lending rate = 10%			
Borrowing rate = 5%			
Deposit	$100	$100	
Required reserves	10	—	
Available for lending	$ 90	$100	
Annual revenue (.10 × Loan)	$ 9	$ 10	
Cost (.05 × Deposit)	5	5	
Net revenue	$ 4	$ 5	
Capital value (Net revenue/.10)	$ 40	$ 50	.80
Panel B: Lending rate = 20%			
Borrowing rate = 15%			
Deposit	$100	$100	
Required reserves	10	—	
Available for lending	$ 90	$100	
Annual revenue (.20 × Loan)	$ 18	$ 20	
Cost (.15 × Deposit)	15	15	
Net revenue	$ 3	$ 5	
Capital value (Net revenue/.20)	$ 15	$ 25	.60

[1]Conditions of the example are that deposits of both banks are $100, the required reserve ratio for members is 10 percent and zero for nonmembers.

difference between the capital values of the two banks does not change. This is because the banks in this example have the same level of deposits and, thus, the differential effect caused by member bank reserve requirements remains constant (see the appendix for a more formal presentation).

A Change in the Interest Rate Spread

Table 4 is similar to table 3 except that it illustrates the effect on relative earnings streams and capital values of a change in the spread between the interest rate banks charge on loans and the rate paid on deposits. The top halves of the two tables are identical. In panel B of table 4, however, the lending rate is assumed to increase while the borrowing rate remains unchanged. The earning streams and capital values of both banks rise with the capital value of the member rising relative to that of the nonmember.

In this example, the interest rate spread increases as the bank lending rate rises, while the borrowing rate remains the same. A qualitatively similar result would occur if the borrowing rate declined, while the lending rate remained the same.

While changes in the spread are potentially important, two problems arise when testing for this effect. First, prior to 1981, the interest rate banks could pay on deposits was subject to a ceiling. During much of the earlier portion of the sample period used here, the ceiling was effective. As a result, changes in the spread were highly correlated with changes in the general level of interest rates. Second, the spread between lending and borrowing rates is the compensation

Table 4

Changes in the Interest Rate Spread and Relative Capital Values[1]

	Members	Nonmembers	Relative Capital Value
Panel A: Lending rate = 10%			
Borrowing rate = 5%			
Deposit	$100	$100	
Required reserves	10	—	
Available for lending	$ 90	$100	
Annual revenue (.10 × Loan)	$ 9	$ 10	
Cost (.05 × Deposit)	5	5	
Net revenue	$ 4	$ 5	
Capital value (Net revenue/.10)	$ 40	$ 50	.80
Panel B: Lending rate = 20%			
Borrowing rate = 5%			
Deposit	$100	$100	
Required reserves	10	—	
Available for lending	$ 90	$100	
Annual revenue (.20 × Loan)	$ 18	$ 20	
Cost (.05 × Deposit)	5	5	
Net revenue	$ 13	$ 15	
Capital value (Net revenue/.20)	$ 65	$ 75	.87

[1]The conditions of the example are that deposits for both banks are $100, the required reserve ratio for member banks is 10 percent, both banks pay 5 percent on deposits, and both extend loans at the same interest rate. In panel A, the loan rate is 10 percent while, in panel B, the loan rate is 20 percent. The borrowing rate does not change. The firm's cost of capital is assumed to equal the lending rate.

banks earn for employing their specialized resources to intermediate financial transactions. When borrowing and lending rates are free to move, as was true after 1981, competition among intermediaries assures that the spread is just sufficient to cover costs. Unless there is a change in the technology of the intermediation process, there is little reason to expect the spread to vary significantly. For these reasons, the spread is excluded in the following empirical analysis and attention is focused on variation in the level of interest rates.[11]

RESERVE REQUIREMENTS AFTER THE MONETARY CONTROL ACT

The right side of table 1 shows the reserve requirements of depository institutions after the implementation of the Monetary Control Act.[12] These reserve requirements apply to depository institutions regardless of Fed membership. They substantially reduce the required reserve balances of member banks

[11]In regressions not reported here, the product of a dummy variable and various proxies for the spread were tested. The dummy variable was used to control for the period of deposit rate ceilings that prevailed prior to 1981. The dummy variable assumed a value of one for the period since relaxation of the interest rate ceilings on deposits (I/1981–IV/1983), and zero otherwise. The coefficient of this variable did not differ significantly from zero. The proxies for the lending rate used to calculate the spread were the one-month commercial paper rate, the 4–6 month commercial paper rate and the 90-day bankers acceptance rate. The borrowing rate proxy was the Federal Reserve discount rate.

[12]See table 1, note 6, for a discussion of the period over which the new requirements were phased in. In the text, the phase-in period is ignored unless otherwise mentioned.

at each level of net demand deposits, while generally increasing them for nonmember banks.

Table 1 also presents the pre- and post-reserve requirements on time and savings deposits. Before the Monetary Control Act, required reserve holdings against personal and nonpersonal time deposits ranged from 1 to 6 percent (with a minimum average requirement of 3 percent), while those on savings deposits were 3 percent. The act reduced these requirements to zero for personal time and savings accounts.[13] Since these deposits represent a substantial portion of total time and savings deposits, this change results in a significant reduction in member bank required reserves.[14] Furthermore, the reserve requirement on managed liabilities and the supplementary reserve requirement on time deposits of $100,000 or more were reduced to zero in July 1980.

While the change in the level of required reserves mandated by the act is clearly important for some issues, what is most important for the purpose of this paper is that this legislation imposes uniform reserve requirements across member and nonmember banks. (See the insert on page 18 for a discussion of some other provisions of the act.)

SOME IMPLICATIONS AND EVIDENCE

The phase-in period for the new reserve requirements, which extended through 1984 for member banks, will not be complete for nonmembers until September 1987. This will mitigate the quantitative effect of the change on the following estimates but the expected qualitative effect should show through.[15]

The Effect of Interest Rate Changes on Relative Stock Prices

In an effort to evaluate the implications of the above argument, quarterly data on the share prices and demand deposit liabilities of 40 publicly traded bank holding companies were examined. The holding companies were divided into two categories depending on whether the subsidiary banks making up an individual holding company were members or nonmembers of the Federal Reserve System.[16] The stock prices of each holding company were adjusted for stock splits and stock dividends, and simple quarterly averages of stock prices and demand deposit liabilities were computed for each of the two categories of holding companies. The sample period runs from I/1974–IV/1983.

The previous arguments imply that the capital values of member relative to nonmember banks will be related in a specific way to certain other variables. Consequently, the variable to be explained (dependent variable) in the following regression is the ratio of the average stock prices of member to nonmember banks. For purposes of the empirical estimate, the dependent variable is expressed in log form.

The following empirical analysis is primarily concerned with the relationship between the dependent variable and the level of interest rates. Since an increase in the level of interest rates is thought to reduce member bank capital values relative to those of nonmember banks, the sign of the estimated coefficient on the level of interest rates is expected to be negative. Further, the above arguments indicate that the relationship between these variables will change in a particular way following implementation of the Monetary Control Act.[17] Consequently, an interaction term is included in the regression as an independent variable.[18]

The interaction term is included to test for the effect that the Monetary Control Act has had in eliminating the differential response of the capital values of members vs. nonmembers to interest rate changes. The interaction term is the product of a coefficient (to be estimated), a dummy variable and the level of the interest rate. The dummy variable assumes a value of one for the period subsequent to implementation of the Monetary Control Act, while its value is zero during the earlier period. Since the hypothesis suggests that the uniform reserve requirements embodied in the legislation will eliminate the adverse conse-

[13]See table 1, note 8, for a definition of personal vs. nonpersonal time and savings deposits.

[14]For example, for banks in the Eighth Federal Reserve District, the personal portion of savings deposits was more than five times greater than the nonpersonal portion, while the personal portion of time deposits was more than four times the nonpersonal portion.

[15]See Pearce and Roley (1983) and (1985).

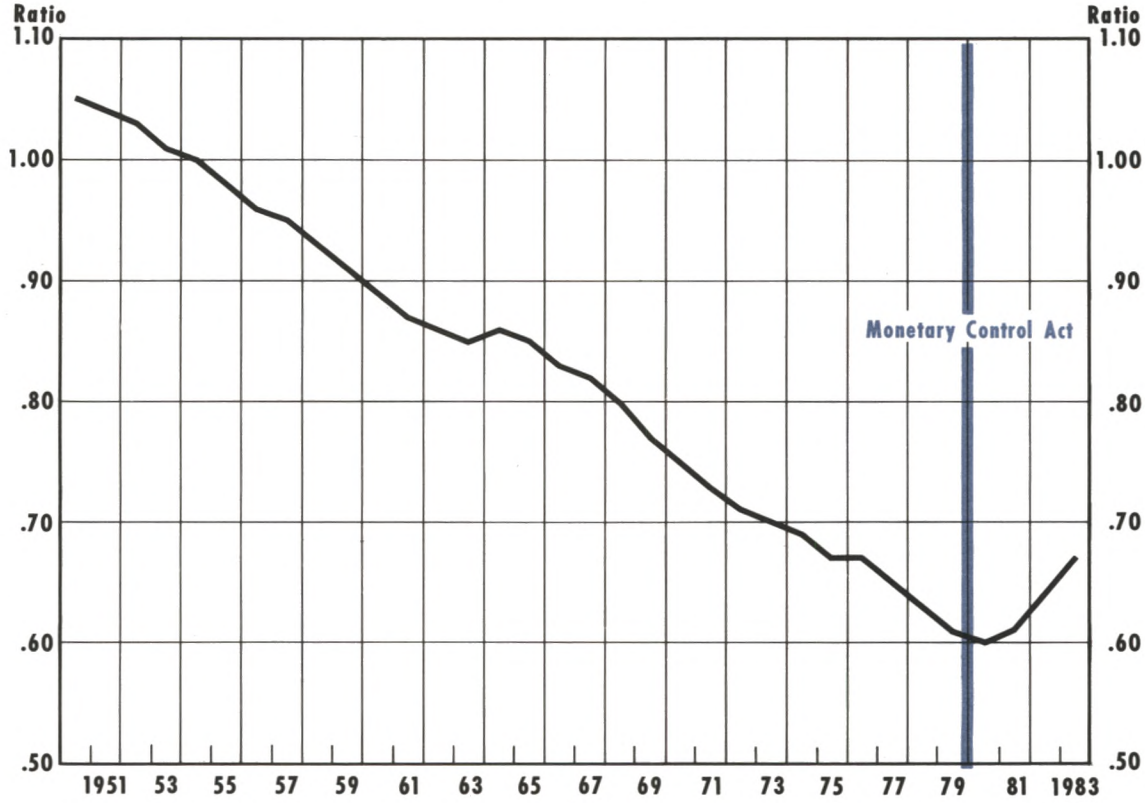
[16]The data set includes only state-chartered banks. Nationally chartered banks are required to be members of the Fed, but are excluded from this sample mainly because they are much larger on average than state-chartered banks and are subject to different regulatory agencies.

[17]See the appendix for a summary of the theory that underlies the estimating equation.

[18]The proxy employed for the general level of interest rates is the corporate Aaa bond rate. A long-term interest rate was selected since it is presumed to represent some average of current and expected future shorter-term interest rates.

Chart 1

Ratio of Member Banks to Nonmember Banks



Some Other Provisions of the Act

The Monetary Control Act contains many other provisions that have important implications for financial firms and markets that are distinct from its impact on required reserves. Most of these provisions are not expected to affect member banks any differently than nonmember banks. There are two exceptions, however.

Before the Monetary Control Act, the Federal Reserve System provided certain services to members that were free of direct charge. In addition, members were allowed to borrow from the System at the Federal Reserve discount rate. Neither of these services were available to nonmember banks. The Federal Reserve System is now required by the Monetary Control Act to charge for the banking services it provides and to make these services available to any bank that wants to use them. In addition, borrowing from the Fed is no longer the exclusive privilege of member banks.[1]

The effect of these two changes is to raise the capital values of nonmember banks relative to member banks and to offset the effect of the reserve requirement changes. It is unlikely, however, that these two provisions of the act completely offset the effect of the reserve requirement changes on relative capital values. Prior to 1980, Federal Reserve membership was declining both absolutely and relative to all commercial banks (see chart 1). The most frequently mentioned reason for leaving was the System's higher reserve requirements. Clearly, for the banks that decided to leave and those new banks that did not join, the System's reserve requirements were too high a price to pay for "free" services and access to the discount window.

[1]See Brewer (1980).

Table 5

The Monetary Control Act and the Stock Prices of Member Vs. Nonmember Banks

Estimate[1]

$$\ln(P_M/P_N) = .065 + .089\, D_M/D_N - .055\, i + .020\, DUM \cdot i$$
$$\quad (.36) \quad (2.89)^* \quad (4.68)^* \quad (4.56)^*$$

$\bar{R}^2 = .54$

$$\text{Rho} = -.30$$
$$(2.02)^*$$

where: P_M/P_N = the average stock price of member banks relative to the average for nonmember banks

D_M/D_N = the average level of member bank demand deposit liabilities relative to the average for nonmember banks

i = a proxy for the general level of interest rates. The proxy is the level of the corporate Aaa bond rate.

DUM = a dummy variable for the period since implementation of the Monetary Control Act. DUM = 1 for the period I/1981–IV/1983 and zero otherwise.[2]

*Significantly different from zero at the 5 percent level

[1]t-values in parentheses. Adjusted for first-order autocorrelation. The regression was checked for second-order autocorrelation with the following result: Rho2 = .07, t-value = .46.

[2]The estimate deteriorates if D = 1 for the period II/1980–IV/1983 and zero otherwise. This definition includes the period between March 1980 when the legislation was passed and November 1980 when it was implemented.

quences experienced by member banks when the general level of interest rates rise, the expected sign of the coefficient on the interaction term is positive. Were it not for the phase-in period, the absolute values of this coefficient and the coefficient on the level of interest rates would be the same, indicating that the elimination of differential reserve requirements completely eliminates the differential response of member bank capital values to the level of the interest rate.

Finally, the ratio of member to nonmember demand deposit liabilities is included as a scale variable. The sign of the coefficient on this variable is ambiguous. However, variation in the size of members relative to nonmembers can affect the dependent variable (see appendix) and, if the regression does not control for this variation, it can contaminate estimates of the other coefficients.

The Evidence

Table 5 presents the results of the regression. The variable included to control for differences in the scale of the two types of banks is significant and positive.

For the purposes of this paper, the coefficients on the interest rate and the interaction term are the most interesting. As expected, the coefficient on the interest rate is negative and significant, indicating that a higher interest rate is associated with a lower value of the dependent variable.

The sensitivity of the dependent variable to interest rate changes is measured by its interest rate elasticity. An estimate of the average elasticity during the period prior to the Monetary Control Act is given by the product of the coefficient of the interest rate and its average level (8.7 percent). In this case, the interest rate elasticity is estimated to be $-.48 (= .055 \times 8.7)$. This indicates that a 1 percent increase in the interest rate reduces the share prices of member relative to nonmember banks by about 0.5 percent.

Implementation of the Monetary Control Act appears to have mitigated this differential effect. The sign of the interaction term is positive and significant. The coefficient, however, is less in absolute value than the coefficient of the interest rate. This is not surprising given that the new reserve requirements were phased in and that the phase-in will continue through 1987.

As of this point in the phase-in (IV/1983), and with the average level of interest rates held constant at 8.7 percent, the interest rate elasticity is estimated to be $-.30[=(.020 - .055) \times 8.7]$. This represents a decline of about 40 percent in the interest rate sensitivity of the dependent variable. It is important to recognize that this sensitivity is reduced not only because the sensitivity of member bank share prices to interest rate changes declines but also because the legislation, by imposing uniform reserve requirements on all banks, increases the interest rate sensitivity of nonmember bank share prices.

The average level of interest rates rose to about 13 percent subsequent to the Monetary Control Act. Had the act not been in place, the share prices of member relative to nonmember banks would have declined by about 24 percent $[=100 \times -.48(13.0 - 8.7)/8.7]$. The legislation, however, tempered this to a decline of only 15 percent $[=100 \times -.30(13.0 - 8.7)/8.7]$.

CONCLUSION

The reserve requirements imposed on the deposit liabilities of financial institutions have the properties of a tax. This tax varies with the interest rate and has differential effects across banks depending on their reserve requirements. An important change in this tax

was made in the Monetary Control Act of 1980. The act imposed uniform reserve requirements across all financial firms by raising reserve requirements for firms that were not members of the Federal Reserve System, while lowering them for member banks. This paper analyzes the legislation's effect on the relationship between the interest rate and the stock prices of member and nonmember commercial banks. As expected, the legislation has significantly reduced the differential effect of interest rate changes on the relative stock price of these banks. In the process, it has raised the after-tax earnings streams and stock prices of member banks, other things the same, while lowering both for nonmember banks.

REFERENCES

Board of Governors of the Federal Reserve System. *Annual Statistical Digest,* 1941–70 and 1970–79.

Brewer, Elijah, et. al. "The Depository Institutions Deregulation and Monetary Control Act of 1980," Federal Reserve Bank of Chicago *Economic Perspectives* (September/October 1980), pp. 2–23.

Cargill, Thomas F., and Gillian G. Garcia. *Financial Deregulation and Monetary Control* (Hoover Institution, 1982).

Fama, Eugene F. "What's Different About Banks?," *Journal of Monetary Economics* (January 1985), pp. 29–39.

Gilbert, R. Alton. "Effectiveness of State Reserve Requirements," this *Review* (September 1978), pp. 16–28.

Gilbert, R. Alton, and Jean M. Lovati. "Bank Reserve Requirements and Their Enforcement: A Comparison Across States," this *Review* (March 1978), pp. 22–32.

Goldberg, Lawrence G., and John T. Rose. "The Effect on Nonmember Banks of the Imposition of Member Bank Reserve Requirements — With and Without Federal Reserve Services," *Journal of Finance* (December 1976), pp. 1457–69.

James, Christopher. "An Analysis of Intra-Industry Differences in the Effect of Regulation: The Case of Deposit Rate Ceilings," *Journal of Monetary Economics* (September 1983), pp. 417–32.

Knight, Robert E. "Reserve Requirements: Part 1: Comparative Reserve Requirements at Member and Nonmember Banks," Federal Reserve Bank of Kansas City *Monthly Review* (April 1974), pp. 3–20.

1980 Financial Institutions Deregulation and Monetary Control. (Commerce Clearing House, Inc., 1980).

Pearce, Douglas K., and V. Vance Roley. "The Reaction of Stock Prices to Unanticipated Changes in Money: A Note," *Journal of Finance* (September 1983), pp. 1323–33.

_____. "Stock Prices and Economic News," *Journal of Business* (January 1985), pp. 49–67.

Prestopino, Chris J. "Do Higher Reserve Requirements Discourage Federal Reserve Membership?" *Journal of Finance* (December 1976), pp. 1471–80.

APPENDIX

Relative Capital Values

Let P, D and r represent capital values, deposits and the required reserve ratio as a function of deposits, respectively, while i_L and i_B are the lending rate and borrowing rate that are common to all banks. If the subscripts M and N indicate values for member or nonmember banks of the terms in the subscript, then:

$$P_M = D_M[i_L - r(D_M)\bullet i_L - i_B]/i_L = D_M[1 - i_B/i_L - r(D_M)]$$

$$P_N = D_N(i_L - i_B)/i_L = D_N(1 - i_B/i_L).$$

$$P_M/P_N = \frac{D_M}{D_N}[1 - \frac{r(D_M)}{1 - i_B/i_L}]$$

A Change in Relative Scales:

$$\frac{\partial(P_M/P_N)}{\partial(D_M/D_N)} = [1 - \frac{r(D_M)}{1 - i_B/i_L}] - [r'(D_M)\frac{dD_M}{d(D_M/D_N)} \times \frac{1}{1 - i_B/i_L}]\frac{D_M}{D_N} \gtrless 0$$

A Change in the General Level of Interest Rates:

$$\frac{\partial(P_M/P_N)}{\partial i} = -\frac{D_M}{D_N}[\frac{i_L - i_B}{i_L^2} r(D_M)] < 0$$

$$di_L = di_B = di$$

A Change in the Member Bank Reserve Schedule:

$$\frac{\partial(P_M/P_N)}{\partial r(D_M)} = -\frac{D_M}{D_N}[\frac{1}{1 - i_B/i_L}] < 0$$

A Change in the Lending Rate Relative to the Borrowing Rate:

$$\frac{\partial(P_M/P_N)}{\partial(i_B/i_L)} = -\frac{D_M}{D_N}[\frac{r(D_M)}{(1 - i_B/i_L)^2}] < 0$$

Note that i_B/i_L must be less than one. An increase in this ratio is consistent with a decline in the spread between lending and borrowing rates.

Recent Changes in Handling Bank Failures and Their Effects on the Banking Industry

R. Alton Gilbert

IN SOME of its public statements in recent years, the Federal Deposit Insurance Corporation (FDIC) has stressed the objective of promoting market discipline of the risks assumed by banks through the influence of uninsured depositors.[1] The FDIC has attempted to accomplish this by allowing the uninsured depositors of some failed banks to suffer losses. In practice, the cases in which uninsured depositors have been exposed to losses involve relatively small banks. As a consequence, the managers of some relatively small banks claim that they have lost large-denomination deposit accounts to larger banks as large depositors reduce the risk of losing part of their deposits by moving their accounts to relatively large banks.[2]

This paper investigates whether the FDIC's actions in recent years indicate a double standard in the treatment of large depositors at large and small banks. Next, the paper analyzes the effects that such a double standard would have on the operation of the banking system. Finally, it investigates whether depositors now act as though they perceive an increase in the risk of holding large-denomination deposits at small banks over holding them at large banks.

R. Alton Gilbert is an assistant vice president at the Federal Reserve Bank of St. Louis. Laura A. Prives provided research assistance.

[1]Federal Deposit Insurance Corporation (1983) and Isaac (1983).

[2]Hill and Finn (1984) and King (1984).

FDIC ACTIONS IN BANK FAILURE CASES

This section presents a brief description of the FDIC's procedures in disposing of the assets and deposit liabilities of insured banks that fail. A knowledge of these procedures is necessary to understand the effect of recent FDIC actions on the risks assumed by large depositors at banks of different size.

Deposit Payoff

A commercial bank is officially declared a failed bank by its chartering agency — the Comptroller of the Currency for a national bank, the state banking authority for a state-chartered bank. The FDIC becomes the receiver of a federally insured bank that fails, with authority to dispose of the assets and to pay off the creditors.

One type of action the FDIC can take as receiver of a failed bank is called a deposit payoff. The FDIC makes payments to each depositor, up to the insurance limit, as soon as the records of deposit accounts can be compiled. Depositors with accounts over the insurance limit become general creditors of the failed bank for the amount of their deposits in excess of the insurance limit. They receive payments on the uninsured portions of their deposits as the FDIC liquidates the assets of the failed bank. Whether they receive full payment on their uninsured deposits depends on the liquidation value of these assets.

Purchase and Assumption Transactions

For the FDIC, there are disadvantages to handling the receivership of a failed bank through a deposit payoff. Banking services are temporarily disrupted, even for the fully insured depositors, who generally must wait a few days to receive their funds. For the uninsured depositors, even if they eventually receive full payment, the delay can throw a wrench into the financing of their activities. Also, the acquisition of the failed bank's assets may be more valuable to another bank than to the FDIC, especially if the other bank could continue to operate the failed bank as a going concern.

The FDIC prefers to handle most bank failure cases through what are called purchase and assumption (P&A) transactions. In these transactions, all of a failed bank's deposit liabilities are assumed by another bank, which also purchases some of the failed bank's assets. The FDIC initiates a P&A transaction by soliciting bids from other banks for the purchase of assets and the assumption of deposit liabilities of a failed bank. The FDIC specifies that an interested bank must assume all deposit liabilities and acquire assets considered to be of good value (i.e., excluding loans and debt instruments that are not likely to be paid in full). Additional cash will be provided by the FDIC if the value of the assets of the failed bank offered for purchase is less than the deposit liabilities to be assumed. Banks that are interested in such a package of assets and liabilities bid for it in terms of a purchase premium. The actual cash payment from the FDIC equals the liabilities of the failed bank, minus the value of the assets of the failed bank purchased by the bank with the winning bid, less the purchase premium bid by that bank.

In deciding between a deposit payoff or a P&A transaction, the FDIC uses a cost test. It estimates its cost under both a deposit payoff and a P&A transaction, based on the bid of the highest purchase premium. The FDIC generally will accept the highest bid for the P&A transaction if its net cost is lower than the estimated costs of a deposit payoff. These estimates are not very precise, and the FDIC has tended to use the P&A method except in situations in which:

1. there is virtually no interest by other banks in acquiring the failed bank, or
2. fraud or other circumstances, such as contingent liabilities, make it difficult to estimate losses and, therefore, to apply the cost test.[3]

[3]Federal Deposit Insurance Corporation (1984), pp. 83–88.

Modified Payout Procedure

In choosing between a deposit payoff and a P&A transaction, the FDIC has had to decide which of the following objectives it would give the greatest weight:

1. to avoid disruption of banking services, or
2. to promote market discipline by uninsured depositors of the risks assumed by banks.

If the FDIC tends to handle bank failure cases through deposit payoffs, uninsured depositors must assume the risk of losses if their banks fail. In response, the uninsured depositors might put pressure on their banks to limit risk. But deposit payoffs, as we have seen, disrupt banking services.

The use of P&A transactions prevents disruptions of banking services. This alternative, however, may give uninsured depositors the impression that they are not exposed to risk of loss when their banks fail. As a consequence, they would not attempt to restrain the risks assumed by their banks.

To avoid the limitations of both procedures, the FDIC announced, in December 1983, that it would use a new procedure for disposing of assets and deposit liabilities in some bank failure cases. The new "modified payout procedure" was adopted to give the FDIC more flexibility in minimizing disruption of banking services, while exposing uninsured depositors to the risk of losses on their deposits.[4]

When a bank failure is handled through the modified payout procedure, the FDIC makes full payments to the insured depositors and partial payments to the large depositors on the uninsured portions of their deposits; the partial payments are based on an FDIC estimate of the proceeds from the liquidation of the assets of the failed bank. If recoveries on the assets eventually exceed the initial estimate, the uninsured depositors receive additional payments; if the proceeds from liquidating those assets fall short of the initial payment, the FDIC absorbs the loss. The partial payment disrupts the activities of uninsured depositors less than the traditional deposit payoff did.

In some cases handled under the modified payout procedure, the insured liabilities of a failed bank are assumed by another bank. This arrangement prevents a disruption of banking services for depositors with full federal insurance. The procedures for arranging this deposit assumption are similar to the procedures in a traditional P&A transaction. The FDIC solicits bids

[4]Federal Deposit Insurance Corporation (1983), pp. III-4—III-6.

for the purchase of some of the assets of the failed bank and the assumption of the fully insured deposit liabilities. The FDIC provides cash to cover a gap between the value of assets purchased and the fully insured deposit liabilities assumed, minus any purchase premium. The FDIC then receives the remaining assets and makes a partial payment to the uninsured depositors. This approach to handling bank failure cases has similarities to both the deposit payoff and P&A transaction procedures.

IS THERE A DOUBLE STANDARD IN THE FEDERAL INSURANCE OF LARGE DEPOSIT ACCOUNTS?

The official limit on deposit insurance coverage, currently the first $100,000 for each depositor at each depository institution, is the same for insured banks of all sizes. There is circumstantial evidence, however, that the FDIC provides large depositors at a few of the nation's largest banks greater protection from loss than large depositors at smaller banks. There is no official statement of this double standard by the FDIC; if it exists, it must be inferred from the FDIC's actions in bank failure cases.

FDIC Actions in Bank Failure Cases Before 1982

Until 1982, every bank failure involving assets greater than $100 million had been handled through P&A transactions, thus protecting the uninsured depositors from any losses.[5] From 1968, when the FDIC adopted its current procedures for P&A transactions, through 1981, only 32 of the 108 bank failure cases were handled through deposit payoffs. These 32 banks, which had average total assets of $10.4 million, had relatively few deposit accounts in excess of the insurance limit. The other 76 had average total assets of $171 million.[6] These FDIC actions could have convinced most large depositors that, in effect, they had complete insurance coverage of their deposit accounts, even if their accounts exceeded the officially stated insurance limit.

Greater Emphasis on Market Discipline by Large Depositors and the Penn Square Case

In the early 1980s, the FDIC became concerned about a lack of market discipline imposed by large depositors on the risks assumed by their banks. This concern was stimulated by the view that various forms of deregulation gave bankers greater freedom to assume more risk.[7]

The response of the FDIC to the failure of the Penn Square Bank of Oklahoma City in 1982 reflected, in part, an intention to increase the degree of market discipline by large depositors. The FDIC closed the Penn Square Bank, which had total assets of $517 million, and paid off each depositor up to the federal insurance limit.

A recent history of the FDIC mentions two reasons for closing the Penn Square Bank and paying off the depositors, rather than protecting the uninsured depositors through a P&A transaction. First, it was not possible at that time for the FDIC to determine the costs of alternative methods of handling the case. Second, the FDIC was concerned that, if the large depositors of the Penn Square Bank were protected from losses, market discipline of the risks assumed by banks through the influence of large depositors would be eroded. The FDIC concluded that paying off the depositors of the Penn Square Bank, up to the insurance limit, and allowing the uninsured depositors to suffer losses, would cause investors to perceive a greater risk in holding large-denomination deposits.[8]

The handling of the Penn Square case indicated that, in order to promote market discipline by large depositors, the FDIC was willing to apply the deposit payoff procedure in the failure of a much larger bank than it had in the past. This case did not reveal, however, whether the FDIC would put a limit on the size of a failed bank that would be handled through a deposit payoff. Thus, the FDIC's actions in this case did not indicate whether the risks of holding large deposit accounts had risen more for those with accounts at small banks or large banks.

Initiation of the Modified Payout Procedure

The next major action by the FDIC to induce uninsured depositors to restrain the risks assumed by their banks was the adoption of the modified payout procedure. As mentioned above, an important objective for adopting this procedure was to expose uninsured

[5]Federal Deposit Insurance Corporation (1984), p. 93.

[6]Ibid., table 4-2, p. 65.

[7]This concern about a lack of market discipline is expressed in Federal Deposit Insurance Corporation (1983).

[8]Federal Deposit Insurance Corporation (1984), pp. 97–98.

depositors to some risk of loss if their banks fail, while minimizing the disruption to banking services.

The first bank failures handled under the modified payout procedure occurred in March 1984. From March through May 1984, the FDIC used the new modified payout procedure in nine bank failure cases. In two of those cases, the banks were closed and the FDIC made payments to all depositors. The only difference between these two cases and the usual deposit payoff case was that the uninsured depositors received partial payments when their banks were closed, instead of receiving any payments after the FDIC liquidated the assets.

In the other seven cases handled under the modified payout procedure, other banks assumed the fully insured deposit liabilities of the failed banks and purchased some of their assets. Since other banks were interested in bidding for the assets and fully insured deposit liabilities of these seven banks, it is likely that their uninsured depositors would also have been protected from losses through P&A transactions if the FDIC had not adopted the modified payout procedure.

All of the seven bank failure cases handled under the modified payout procedure, with assumption of fully insured deposit liabilities by other banks, involved relatively small banks. The total deposits of those seven banks ranged from $16 million to $116 million, with a mean of $54 million. Their uninsured deposits on average were $1.6 million.

The Continental Illinois Crisis

The rapid withdrawal of foreign deposits from the Continental Illinois National Bank, Chicago, created a financial crisis for that bank in May 1984. The FDIC, the Federal Reserve, and the Comptroller of the Currency became concerned about the effects that the failure of Continental would have on other depository institutions and economic activity in general. These agencies issued a joint news release on May 17, 1984, that described a program of assistance for Continental. That joint news release includes the following statement:

> In view of all the circumstances surrounding Continental Illinois Bank, the FDIC provides assurance that, in any arrangements that may be necessary to achieve a permanent solution, all depositors and other general creditors of the bank will be fully protected and services to the bank's customers will not be interrupted.

This statement indicates that, although the FDIC wishes to induce large depositors to restrain the risks assumed by their banks, there is an upper limit on the size of banks at which large depositors are subject to losses.

From June 1984 through May 1985, the FDIC handled six more bank failure cases by arranging for the assumption of the fully insured deposit liabilities by other banks, but limiting payments on uninsured deposits to the proceeds from liquidating the assets of the failed banks. Total deposits of those six banks range between $4 million and $46 million (a mean of $26 million), with average uninsured deposits of about $400,000.[9]

A Review of FDIC Actions in Recent Years

The actions of the FDIC since mid-1982 reveal the following pattern: To promote market discipline by large depositors, the FDIC is willing to close a failing bank with total assets as large as $500 million. In practice, the modified payout procedure, which was adopted to promote market discipline by large depositors, has been used in the failure of a few relatively small banks. Banks as large as Continental Illinois appear to be exempt from this policy. This combination of FDIC actions may imply that the risk of holding deposits in an account that exceeds the federal insurance limit has increased in recent years, unless that account is at one of the largest banks in the nation.

IMPLICATIONS FOR THE OPERATION OF THE BANKING SYSTEM

If large depositors think they are protected from losses by holding their funds at relatively large banks, they will have no incentive to monitor the risks assumed by these banks or to put pressure on the management of these banks to restrain risks. Thus, by protecting depositors at relatively large banks from losses, the FDIC may have reduced the restraints on risks assumed by relatively large banks.

Actions that favor uninsured depositors at relatively large banks also may have implications for trends in the nation's banking structure. The share of the nation's banking assets at a few of the relatively large banks may rise over time, as large depositors shift their funds to the relatively large banks to reduce risks.

---

[9]In some of these six cases, the large depositors did not receive partial payments when the banks failed, because it was difficult for the FDIC to estimate recovery on the assets it assumed.

HAVE DEPOSITORS RESPONDED TO THE DIFFERENTIAL TREATMENT OF LARGE AND SMALL BANKS?

Before concluding that the recent actions of the FDIC in bank failure cases have the implications for the banking system discussed above, one must determine whether depositors have responded to what appears to be differential treatment of large and small banks. There are various reasons why the events described above might not affect the behavior of uninsured depositors. Large depositors may have believed for some time that the FDIC would not allow a bank the size of Continental Illinois to fail. The FDIC had acted in the past to prevent the failure of relatively large banks with total assets smaller than those of Continental.[10] Thus, the announcement of the deposit guarantee for Continental in May 1984 may have come as no surprise.

Alternatively, holders of uninsured deposits may continue to have confidence in their own banks despite the increased risk of keeping their accounts at small banks. Or, they might not be aware of the implications of FDIC actions in recent bank failure cases.

There are two potential pieces of evidence that would support the view that depositors consider the risk of holding uninsured deposits at small banks to have risen relative to the risk of holding deposits of similar size at large banks. First, interest rates that small banks offer to attract large-denomination deposits must rise relative to the interest rates offered by large banks. Second, the share of total time deposits at all commercial banks in accounts above the insurance limit must rise at relatively large banks and decline at small banks, as depositors shift their large-denomination deposit accounts to relatively large banks. Both of these patterns would have to begin after mid-May 1984, when the FDIC announced the deposit guarantee of Continental Illinois Bank.

THE EVIDENCE

Data on the interest rates paid on large-denomination time deposits are not available for relatively small banks. Consequently, the observations are limited to those for the allocation of large time deposits among large and small banks.

[10]See the Federal Deposit Insurance Corporation (1984), pp. 89–97.

Data from Weekly Reporting Banks

There is no official list of banks that are too large to fail. As an approximation to the group of banks that may have such status, this paper uses the 30 largest banks in the nation.[11] Small banks are identified as those smaller than weekly reporting banks (which include all commercial banks with total assets of $1.4 billion or more as of December 31, 1982).

Chart 1 does not indicate a sustained pattern of decline in the share of large-denomination time deposits at small banks or a rise in the share at relatively large banks after mid-May 1984. The share of large-denomination time deposits at the small banks did decline from almost 40 percent in the first week of May 1984 to about 37 percent in the last week in June of last year. That change might reflect an initial response by depositors to the handling of the Continental Illinois situation by the FDIC. In contrast, that decline might reflect a seasonal pattern; the share of large-denomination time deposits at small banks declined between the same weeks in 1982. Whatever the cause of that dip, it was more than reversed by October of last year, and the share of large time deposits at small banks continued to rise through May 1985. The share of large-denomination deposits at small banks declined in June 1985, as it had in June of 1982 and 1984.[12]

Data on Small Banks from the Report of Condition

Observations in chart 1 may suffer from several measurement problems. First, the banks with total assets just below $1.4 billion are included together with much smaller banks. A finer breakdown of banks by asset size may be necessary to detect an outflow of large-denomination time deposits from small banks.

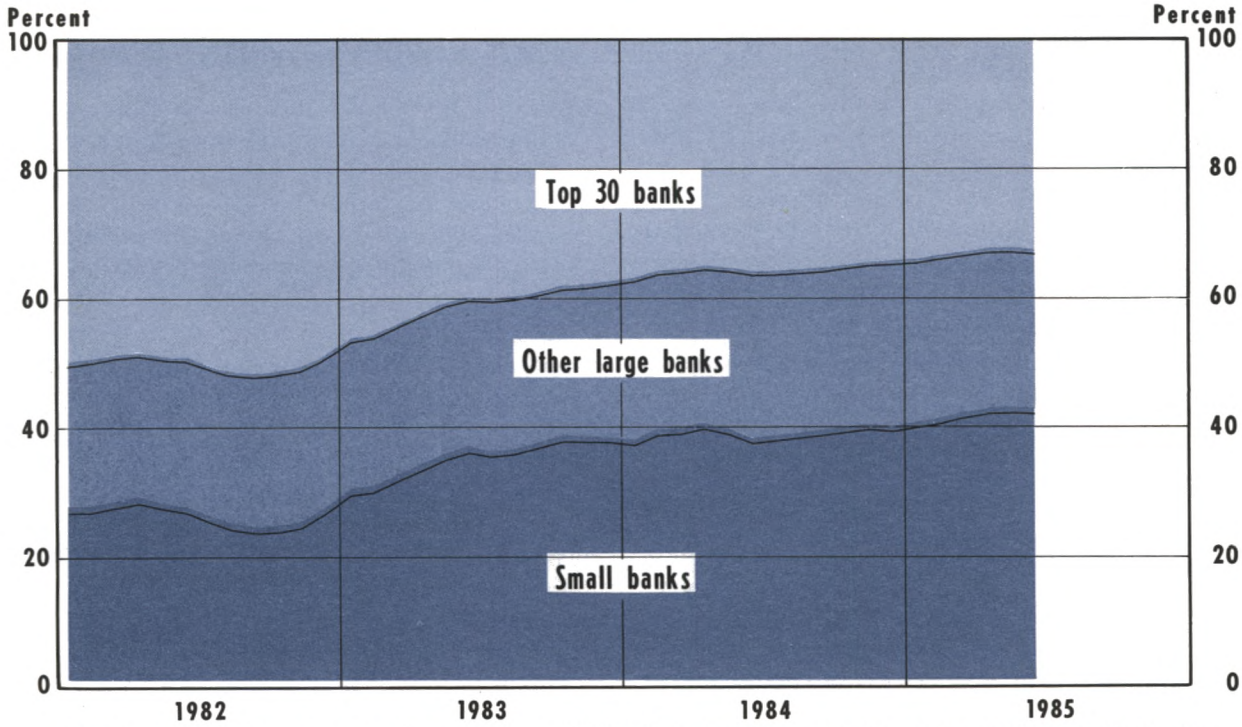
Second, some of the time deposits in denominations of $100,000 or more are in accounts of exactly

[11]In September 1984, the Comptroller of the Currency, C.T. Conover, was reported in the press as saying that the federal regulators would not allow the largest 11 banks to fail; later, however, he denied stating any cut-off figure for banks too large to fail. See Trigaux (1984).

[12]The patterns in chart 1 reflect differential effects of the authorization of money market deposit accounts (MMDAs) at large and small banks. Large time deposits at all commercial banks declined sharply after the announcement that MMDAs would be available in mid-December 1982. These deposits had peaked in October 1982, but by May 1983, had declined by about $50 billion. During the same period, large time deposits at small banks *rose* by about $13 billion. Thus, the small banks do not seem to have been affected by the substitution between large-denomination deposits and MMDAs in the same way as the larger banks.

Chart 1

Share of Large-Denomination Time Deposits at Large and Small Banks



NOTE: Large time deposits are in denominations of $100,000 or more. Large banks are the weekly reporting banks, and small banks are below the size of weekly reporters. The top 30 banks are the largest commercial banks, in total assets, as of December 1984.

Latest data plotted: June

$100,000, and, therefore, are fully insured. Thus, the percentage of time deposits in denominations of $100,000 or more overstates the percentage of time deposits in accounts that are only partially insured.

The third possible measurement problem is that many of the small banks are subsidiaries of large banking organizations. Uninsured depositors may be less concerned about possible losses of their deposits at a relatively small bank if it is a subsidiary of a large banking organization.

The relevance of these possible measurement problems can be investigated with data from the Report of Condition of each commercial bank. Table 1 presents the percentage of large-denomination time deposits in the banking system at groups of relatively small banks in various size categories. To eliminate banks that are subsidiaries of relatively large banking organizations, the banks in table 1 are in organizations with total banking assets less than $1 billion.

The issue of which large-denomination time deposits are only partially insured is more difficult to settle. In attempting to exclude time deposits in denominations of $100,000 or more that are fully insured, the best approach available with the existing data is to exclude from the calculations those banks with brokered deposits in denominations of $100,000 or less, which are called "retail brokered deposits." Deposit brokers typically break down the funds they place at an individual bank into units of $100,000 or less for their individual investors, so that the deposits of each investor are fully insured. The banks with retail brokered deposits, therefore, are the ones likely to have the largest proportion of time deposits in denominations of exactly $100,000.

Table 1

Percentage of Large-Denomination Time Deposits in Various Size Banks[1]

Bank size category (millions of dollars)	Number of banks	1984 March	1984 June	1984 September	1984 December	1985 March
Under $10	422	0.14%	0.15%	0.16%	0.17%	0.19%
$10 to 25	1,450	1.13	1.14	1.18	1.21	1.33
$25 to 50	1,464	2.60	2.58	2.64	2.66	2.89
$50 to 100	966	3.94	3.89	3.98	3.93	4.28
$100 to 300	584	5.63	5.63	5.80	5.79	6.11
$300 to 500	93	2.37	2.38	2.46	2.45	2.50
$500 to 1,000	60	2.33	2.36	2.40	2.53	2.59
Total	5,039	18.14	18.13	18.62	18.74	19.89

[1]The same banks are included in each size group as of each of the five Report of Condition dates. As of each date, these banks reported no retail brokered deposits. These banks are assigned to the same size group as of each date, based on their total assets as of March 1984. For banks in each group, the sum of their time deposits in denominations of $100,000 or more are calculated as percentages of large-denomination time deposits as of the same date at all commercial banks that reported no retail brokered deposits.

Table 2 provides indirect evidence on the extent to which the time deposits in denominations of $100,000 or more exceed the insurance limit at banks with no retail brokered deposits. The FDIC collected data through June 1981 on various types of deposit accounts that exceeded the insurance limit. As of June 1981, the percentages of time deposits in denominations of $100,000 or more are only slightly higher than the percentages in accounts that exceeded the insurance limit. Thus, as of June 1981, very high percentages of time deposits in denominations of $100,000 or more were only partially insured. Also, for banks of comparable size, the percentages of time deposits in denominations of $100,000 or more in June 1984 are similar to the percentages in June 1981. These comparisons of observations in table 2 provide a basis for concluding that high percentages of the time deposits in denominations of $100,000 or more, as of June 1984, were only partially insured. Data are not available, however, to provide direct evidence on this issue.

Data on retail brokered deposits for all federally insured commercial banks are not available before March 1984. Beginning with the quarterly Report of Condition in March 1984, each bank reports the total dollar amount of all brokered deposits and of retail brokered deposits. Data based on the Report of Condition, therefore, are limited to the period since March 1984.

The purpose of the calculations presented in table 1 is to determine whether banks in various size groups have increased or decreased their share of large-denomination time deposits in the banking system. Banks in each of the size groups have the following characteristics: First, each bank filed a Report of Condition on all five dates. Second, each bank reported no retail brokered deposits on each date. Third, each bank is assigned to one size class for all five dates, based on its total assets as of March 1984. Thus, each size group includes the same banks for each of the Report of Condition dates.

The numerator of each percentage in table 1 is the sum of time deposits in denominations of $100,000 or more for a given group of banks, as of a Report of Condition date. The denominator is the sum of large-denomination time deposits of all commercial banks as of the same date, excluding those banks that reported retail brokered deposits.

As of March 1984, these 5,039 banks accounted for about 18 percent of large-denomination time deposits of the banking system. By March 1985, that percentage rose to almost 20 percent, and the share of large-denomination time deposits rose for each of the seven groups of banks. Thus, the evidence in chart 1 and table 1 are consistent: the share of large-denomination time deposits at relatively small banks is higher in early 1985 than a year earlier, before the announcement of the federal guarantee of all deposit liabilities at the Continental Illinois bank.

Table 2

Average Percentages of Time Deposits in Large-Denomination Accounts

Bank size category (millions of dollars of total deposits)	Percentage of time deposits in accounts larger than $100,000, June 1981[1]	Percentage of time deposits in accounts of $100,000 or more	
		June 1981	June 1984[2]
Under $10	14.9%	17.2%	21.1%
$10 to 25	16.9	18.2	20.8
$25 to 50	20.4	21.4	22.7
$50 to 100	25.6	26.9	26.6
$100 to 500	34.8	37.3	34.1
$500 to 1,000	43.2	46.6	36.7

[1]The numerators and denominators of these percentages include time deposits of individuals, partnerships, and corporations and public funds invested in time and savings deposits at commercial banks.

[2]Banks included in the calculations for June 1984 have no retail brokered deposits; they are in banking organizations with total banking assets less than $1 billion.

CONCLUSIONS

The Federal Deposit Insurance Corporation (FDIC) has been putting greater emphasis in recent years on increasing the incentives for large depositors to restrain the risks assumed by their banks, by allowing the uninsured depositors of some failed banks to suffer losses. FDIC actions designed to promote market discipline by large depositors, however, have affected primarily relatively small banks. In contrast, the FDIC guarantee of all deposit liabilities of the Continental Illinois National Bank in May of last year indicates that the large depositors of a few of the nation's largest banks may have no risk of losses if their banks experience large reductions in the value of their assets.

This contrast in treatment of large and small banks might be expected to induce large depositors to shift their accounts to a few of the nation's largest banks. The data available to test this hypothesis have some limitations. The most appropriate conclusion, given the nature of the data, however, is that large depositors have not shifted their accounts from small to large banks since the announcement of the FDIC guarantee of all deposit liabilities of Continental Illinois.

REFERENCES

Federal Deposit Insurance Corporation. "Deposit Insurance in a Changing Environment" in *A Report to Congress on Federal Deposit Insurance* (April 1983).

_____. *The First Fifty Years: A History of the FDIC, 1933–1983* (Washington, D.C., 1984).

Hill, C. Christian and Edwin A. Finn. "Confidence Crisis: Big Depositors' Runs on Beleaguered Banks Speed the Failure Rate," *Wall Street Journal,* August 23, 1984.

Isaac, William M. Address before the Management Conference of the National Council of Savings Institutions, New York, December 6, 1983.

King, A. J. "Treat Small Banks, Continental Similarly," *American Banker* (May 31, 1984), pp. 4, 12.

Trigaux, Robert. "Comptroller Trying to Dispel Reports of 'Guarantees' for Top 11 Banks Only," *American Banker* (September 28, 1984), p. 3.

Are Weighted Monetary Aggregates Better Than Simple-Sum M1?

Dallas S. Batten and Daniel L. Thornton

THE past 10 years have been marked by financial innovation and deregulation, much of which has blurred the distinction between transaction and savings deposits. Traditional non-interest-bearing transaction deposits now pay explicit interest like savings deposits, while a number of savings-type deposits with limited transaction characteristics have been developed.

A number of analysts believe that these financial developments have altered significantly the relationship between M1 growth and the growth of GNP, rendering the narrow monetary aggregate less useful as an intermediate target for monetary policy.[1] Others have objected on broader grounds, arguing that these innovations illuminate the problem of simply adding up various financial assets (currency, demand deposits, NOW accounts, etc.) to obtain a "simple-sum" monetary aggregate. They argue that various assets have different degrees of "moneyness" — that is, the monetary services that each asset provides — so that the dollar amount of each asset should be weighted by its degree of moneyness in obtaining a suitable monetary aggregate. Such an aggregate presumably should have a closer and more predictable relationship with economic activity and may be affected less by financial innovations. The most novel and innovative suggestions have come from individuals who have constructed weighted monetary aggregates based on alternative theoretical considerations. Two recent and popular innovations along these lines come from William Barnett (1980) and Paul Spindt (1985).[2]

A central issue now is whether weighted monetary aggregates are better intermediate policy targets than simple-sum aggregates like M1. A necessary condition for using a monetary aggregate as an intermediate policy target is that there be a close and predictable relationship between the monetary aggregate target and the objectives of economic policy.[3] Thus, if an aggregate can be found that has a closer and more predictable link to economic activity, it could be useful in conducting countercyclical stabilization policy.[4]

The purpose of this article is threefold. First, we review briefly the important issues associated with constructing weighted and simple-sum monetary aggregates and discuss the alternatives suggested by Barnett and Spindt. Second, we compare and contrast these weighted monetary aggregates with simple-sum M1. Finally, we investigate whether there is a more stable and predictable relationship between the alter-

Dallas S. Batten is a research officer and Daniel L. Thornton is a senior economist at the Federal Reserve Bank of St. Louis. *Paul G. Christopher and Rosemarie V. Mueller provided research assistance.*

[1]The Federal Open Market Committee was so concerned by these developments that it altered the relative weights given to M1 and the broader monetary aggregates several times during the 1981–82 period in making its policy recommendations and suspended the use of M1 as an intermediate policy target in fall 1982. Furthermore, some analysts have been so concerned that M1 is no longer a useful target of monetary policy that they have suggested a return to the Keynesian system of interest rate targets or a reliance on a broader simple-sum monetary aggregate, like M2, M3 or some measure of credit, as an intermediate target. Still others have suggested that the Fed target directly on nominal GNP (though the procedures for pursuing this target are seldom discussed in detail). See Thornton (1982, 1983). Simple-sum M1 was re-introduced as an intermediate policy target in 1984; see Hafer (1985).

These other suggestions have been investigated elsewhere. The use of interest rates as an intermediate policy target is predicated on the existence of a liquidity effect, which has been shown to be short-lived and weak. See Brown and Santoni (1983) and Melvin (1983). For empirical evidence on M1 and M2, see Batten and Thornton (1983) and on the broader debt measure, see Hafer (1984).

[2]Earlier work along these lines includes Chetty (1967) and Hamburger (1966).

[3]The strength of the relationship between the ultimate goals of policy and the intermediate policy target is only one of the criteria for evaluating a monetary target.

[4]This should not be interpreted to imply that monetary policy can be used successfully for short-run economic stabilization. This is merely a necessary condition; it is not sufficient.

natives proposed by Barnett and Spindt and GNP, than between simple-sum M1 and GNP. We investigate this by examining the behavior of the income velocity of each of these aggregates.

THE MOTIVATION FOR WEIGHTED AGGREGATES

Monetary theory has emphasized two different, but not mutually exclusive, functions of money: a medium of exchange and a store of wealth. The medium-of-exchange function was emphasized in the work of Fisher (1911), while the store-of-wealth motive was emphasized by Pigou (1917), Marshall (1923) and Keynes (1936). It has been recognized for some time that different financial assets perform these functions to different degrees. For example, currency and demand deposits are both generally acceptable as media of exchange, but are not perfect substitutes for this purpose in all transactions. Furthermore, these assets bear no explicit interest and, as a consequence, are poor stores of wealth relative to interest-bearing savings and time deposits of equal risk.

Because assets such as time and savings deposits cannot be used directly in exchange, it was common to define money to include only medium-of-exchange assets. It was not until Friedman (1956), Friedman and Meiselman (1963) and Friedman and Schwartz (1970) emphasized money's role as a "temporary abode of purchasing power" (i.e., a temporal bridge between the sale of one item and the purchase of another), that it became common to consider broader monetary aggregates that included non-medium-of-exchange assets.[5]

Once the medium-of-exchange line of demarcation between money and non-money assets was breached, however, it became difficult to isolate any other characteristics that differentiate money from non-money assets.[6] As a result, many economists defined money as that group of assets that satisfied some empirical criteria.[7] Perhaps the most frequently used criterion was the closeness of the relationship between a particular monetary aggregate and GNP.[8]

The Effect of Financial Innovations

The difficulty in distinguishing between money and non-money assets has been exacerbated by financial innovation and deregulation. Several savings-type assets with limited transaction characteristics have been developed (e.g., money market mutual funds (MMMFs), money market deposit accounts (MMDAs) and automatic transfer services (ATS)) and medium-of-exchange assets now pay explicit interest (e.g., NOWs and Super NOWs). Additionally, there have been a number of other innovations that have increased the substitutability between medium-of-exchange and non-medium-of-exchange assets, such as overnight repurchase agreements (REPOs) and continuous compounding of interest on savings-type deposits.[9] Hence, the distinction between transaction- and savings-type assets has been blurred even more.

The Role of Index Numbers

If different assets have different degrees of moneyness, we may wish to aggregate (add) them with respect to this homogeneous characteristic. This point can be made more clearly with a physical example. A ton of coal, a kilowatt of electricity and a barrel of oil are not homogeneous in terms of their volumes or weights and, hence, cannot be aggregated in terms of these measures. If, however, we are concerned with their energy equivalences, measured say by BTUs, they can be thought of broadly as homogeneous and can be aggregated in terms of their BTU equivalence. The

[5]According to Laidler (1969), the debate about whether non-medium-of-exchange assets are money dates back, at least, to the Napoleonic wars.

[6]Some characteristics that have been used include liquidity, substitutability between non-medium-of-exchange and pure medium-of-exchange assets, and the strength and stability of the relationship between a composite of various financial assets and nominal income. Additionally, Pesek and Saving (1967) have argued that, since money has its primary effect on the economy through a wealth effect, an asset's moneyness should be determined by the extent to which it is part of society's net wealth. See Laidler (1969) for a discussion of this point.

[7]Although not all of the studies have employed the same empirical criteria, many have focused on the relationship between the proposed monetary aggregate(s) and economic activity. Furthermore, not all agree that money can be defined empirically, e.g., Mason (1976).

[8]Frequently, the assets considered had to satisfy an auxiliary condition, for example, they must be "gross substitutes." See Friedman and Schwartz (1970) or Friedman and Meiselman (1963).

[9]The impact of these innovations on the substitutability between medium-of-exchange and non-medium-of-exchange assets can be made clear via an example. At one time, it was common for depository institutions to compound interest quarterly on savings and time deposits, so that interest was paid only on balances on deposit on the day of compounding. Such practices severely limited the advantage of these accounts over demand deposits as temporary abodes of purchasing power, since the interest income gain from temporarily switching from demand deposits to savings deposits could be lost if the transaction had to be made prior to the quarterly compounding date. Other changes that permitted an easier transfer between medium-of-exchange and non-medium-of-exchange assets would have a similar effect.

same is true for aggregating financial assets, but, since they are expressed in dollars, it may seem more natural simply to add dollar amounts of assets that have a high degree of moneyness, however defined. This is the rationale for the construction of simple-sum monetary aggregates.

Unfortunately, adding dollar amounts of assets is not the same as aggregating them by a homogeneous measure of their moneyness. As the dollar amounts of various components change through time, they may represent different levels or degrees of moneyness. Conversely, the same dollar value of the aggregate composed of different dollar values of its various components may not represent the same level of monetary services. Consequently, the dollar (simple-sum) aggregate may misrepresent the amount of such services provided.

Index numbers can be used to aggregate assets by a homogeneous characteristic. Conceptually, they enable the construction of an aggregate based on this characteristic so that changes in the index reflect *only* changes in some quantitative measure of this characteristic. It is not surprising, therefore, that both Barnett and Spindt use index aggregation to construct their alternative weighted monetary aggregates. (The assets included in simple-sum M1, Barnett's broadest monetary aggregate (MSI4) and Spindt's aggregate (MQ) appear in the insert on this page.[10])

Medium-of-Exchange Assets and the Definition of Monetary Aggregates

	Simple-Sum M1	MQ	MSI4
Medium-of-Exchange Assets			
Currency	X	X	X
Travelers checks	X	X	X
Demand deposits	X	X	X
Other checkable deposits	X	X	X
Credit union share draft accounts	X	X	X
MMDAs		X	X
MMMFs		X	X
Savings deposits subject to telephone transfer		X	X
Non-Medium-of-Exchange Assets			
Savings deposits not subject to telephone transfer			X
Small time deposits			X
REPOs			X
Eurodollar deposits			X
Large time deposits			X
U. S. savings bonds			X
Short-term Treasury securities			X
Commercial paper			X
Bankers acceptances			X

Monetary Services Index (MSI)

Barnett has developed a number of monetary aggregates based on the idea that the essential function of money is to bridge the temporal gap between the sale of one item and the purchase of another. Assets that serve this purpose must be easily and quickly convertible into and out of medium-of-exchange assets. Following a suggestion of Friedman and Schwartz (1970) — see Barnett and Spindt (1982) — Barnett extends the approach of estimating the substitutability between non-medium-of-exchange assets and a pure medium-of-exchange asset employed by Chetty (1969), Hamburger (1966) and others. Specifically, he applies index number theory to construct indexes of financial assets that reflect the total utility, relative to some base period, attributable to the monetary services obtained from these assets.[11]

This approach can be easily understood by thinking of assets that provide monetary services as being on a continuum with pure medium-of-exchange assets (currency) at one end and "pure" store-of-wealth assets at the other. The pure medium-of-exchange assets earn no interest and are useful only as a medium-

[10]Other monetary service indexes (MSI) include the assets in simple-sum M1, M2 and M3. We ignore these here because MSI4 is the only MSI that has an intuitively appealing rationale, given the asset motive on which it is based. In particular, it attempts to extract the "moneyness" from a broad range of financial assets. In contrast, the narrower MSI are constrained by the assets arbitrarily included in each.

[11]The construction of these aggregates need not be based solely on a utility maximization approach. If it is based on other objective functions, however, its interpretation is altered.

Originally, Barnett called these aggregates "Divisia monetary aggregates" because a Divisia index was used to construct them. The Federal Reserve Board, under whose auspices these aggregates were originally constructed and are still maintained, has recently undertaken a substantial revision to correct inconsistencies and errors in the original computer programs and data, and to incorporate new data not readily available at the time these aggregates were initially constructed; see Farr and Johnson (1985). The Divisia index is no longer used to construct these aggregates. Consequently, they are no longer referred to as Divisia monetary aggregates but are now called "monetary services indexes" (MSI). Since the data reported here reflect these recent changes, this new terminology is adopted here as well.

of-exchange.[12] The pure store-of-wealth assets earn a market interest rate but are not useful as a *temporary* abode of purchasing power, although they may be used to transfer purchasing power over longer periods of time. Consequently, the latter group of assets provides no monetary services by this criterion. The assets that fall between these extremes yield monetary services greater than zero but less than those of the pure medium-of-exchange assets.

The monetary-service flow from each asset is based on its "user cost" as measured by the difference between the rate of interest on a pure store-of-wealth asset and the own rate of return on each asset. Currency, which has an own rate of zero, has the highest user (opportunity) cost. Medium-of-exchange assets like demand deposits (which bear no explicit interest, but bear some implicit interest, e.g., gifts or no service charges) have a smaller user cost and, hence, receive a smaller weight. Non-medium-of-exchange assets that yield explicit returns closer to those of the pure store-of-wealth assets receive still smaller weights.

The MQ Measure

Spindt's weighted monetary aggregate, MQ, is an index of transaction assets whose weights are based on each asset's turnover, along lines originally suggested by Fisher (1922). This measure is based on a pure transaction approach to money and, thus, marks a clear departure from the MSI of Barnett. Furthermore, Spindt's measure weights each of its components by a measure of turnover in purchasing final output (GNP); assets with relatively high turnover rates receive relatively larger weights.[13]

Despite the fact that the turnover rates are used in the calculation of MQ, the money stock measure moves only when there is a change in monetary services between periods, so that its velocity changes only when there is a change in the turnover rates. In contrast, the velocity of the MSI and simple-sum M1 can change even if there is no change in their turnover rates. Hence, we should expect to see a more stable relationship between MQ and GNP.[14]

Simple-Sum M1

By weighting each component equally, simple-sum aggregates implicitly assume that each component is a perfect substitute for the others in providing monetary services. Furthermore, the narrow aggregate, simple-sum M1, excludes both non-medium-of-exchange assets and some assets with limited transaction characteristics like MMMFs and MMDAs. The broader simple-sum aggregates, like M2, M3 and the Fed's broadest measure, total liquidity (L), include larger amounts of non-medium-of-exchange assets. Consequently, these broader simple-sum aggregates may misrepresent significantly the monetary services provided by including non-medium-of-exchange assets, which provide relatively low levels of monetary services, on an equal footing with medium-of-exchange assets, which provide relatively high levels of monetary services.

A financial innovation that results in a shift from assets not in simple-sum M1 to assets in simple-sum M1 would cause the same change in measured money, regardless of the source of the shift. In contrast, similar innovations would cause different changes in the MSI or MQ. The extent of the impact depends on the difference between the asset's own rate of return and that of the pure store-of-wealth asset (for the MSI) and on the asset's relative turnover rate in the purchase of goods and services (for MQ).

As a result, these new aggregates may be affected less by innovations. For example, to the extent that the nationwide introduction of NOW accounts on January 1, 1981, drew deposits out of savings accounts (i.e., idle balances) into NOW accounts, the growth of simple-sum M1 would be inflated. In contrast, because NOW accounts bear an interest rate closer to the pure store-of-wealth rate, they receive a smaller weight in the MSI. Consequently, if this regulatory change resulted in a significant shift out of savings-type assets into NOW accounts, the MSI might be affected less by this regulatory change.

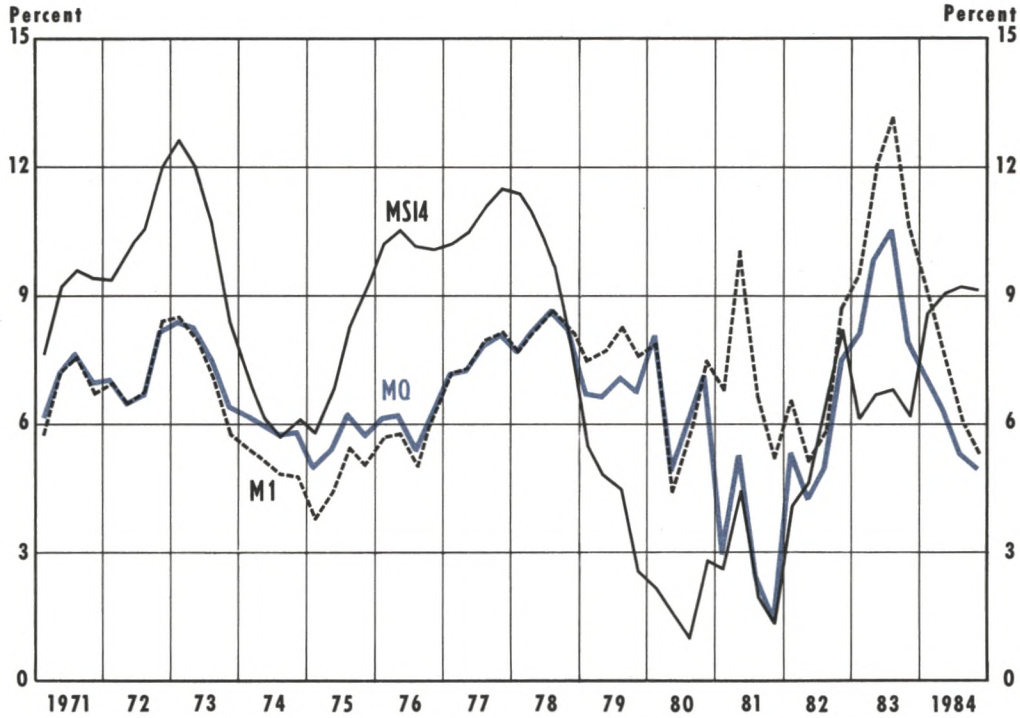
To the extent that NOW accounts are used predominantly as a store of wealth rather than a medium of exchange, MQ would be affected to a lesser degree

[12]Technically, currency, like all financial assets, also acts as a store of wealth; however, the argument is that there exists an asset (fully insured savings deposits) that perform this function better with equal risk. Consequently, no maximizing individual would willingly hold currency purely as a store of wealth given such an alternative.

[13]It is clear from this discussion that two distinct, but related, issues are involved here. The first centers around whether the asset or transactions measure (approach) is preferable. The second is a question of the appropriate weighting scheme. These issues are related in the sense that if the asset approach is preferred, then, by implication, the MSI weighting scheme is preferred as well, since not all of these assets can be used directly in transactions. If the transactions approach is preferred, however, the question of the weighting scheme remains open. The best weighting scheme may still involve the difference between the own rate and the rate on the most liquid non-medium-of-exchange asset.

[14]For a discussion of this point, see Spindt (1985). At a more technical level, Spindt (1983) has shown that it is only possible to interpret these aggregates sensibly by using an intertemporal measure.

Chart 1
Growth Rates of Monetary Aggregates



than simple-sum M1 by NOW account growth because NOW accounts initially had a lower turnover rate in transactions than did currency and demand deposits. Also, MQ and broader MSI contain savings-type assets not included in simple-sum M1 (e.g., money market mutual funds). Consequently, their growth rates would be affected less if the growth in NOW accounts resulted from a shift out of such deposits. If, however, most of the growth in NOWs came from demand deposits, then simple-sum M1 would be relatively unaffected and the growth of both MQ and the MSI would decrease since demand deposits had larger weights than NOWs in MQ and the MSI.

The advantage these aggregates propose to offer, however, is not without costs. The calculation of the weights in the MSI and MQ requires more information than that required to construct simple-sum M1. Consequently, the construction of these alternative aggregates may introduce larger measurement and specification errors than those of omission and inappropriate weighting associated with simple-sum M1 (see the insert on the next page).[15]

A COMPARISON OF GROWTH RATES AND WEIGHTS

As an initial step in the examination of alternatives to simple-sum M1, a comparison of the year-over-year growth rates of simple-sum M1 (hereafter denoted as M1), MQ and the broadest monetary service index (MSI4) is presented in chart 1. Several interesting points emerge.

First, the growth rate of MSI4 has not conformed to that of the other two monetary aggregates anytime during the I/1971–IV/1984 period. Second, up to 1981, the growth rates of M1 and MQ are similar and move together. The mean growth rates for M1 and MQ over the I/1971–IV/1980 period are 6.6 and 6.8 percent, respectively; the standard deviations for the same aggregates are 1.36 and 1.00 percent, respectively. On the other hand, MSI4 growth during this period is significantly higher and more variable; its average growth was 8.08 percent with a standard deviation of 3.26

[15]We say "might be" here for several reasons. What is the appropriate weighting scheme is an open question. Furthermore, if we could decide on the most appropriate scheme from a theoretical point of view, the magnitude of the weights would still be an empirical issue.

Information and Estimation Requirements of the MSI and MQ Aggregates

The construction of the monetary service indexes and MQ require more information than is entailed in the construction of a simple-sum aggregate with identical components. In each case, data on the quantities of each component are necessary; however, both the MSI and MQ require additional information and, hence, are open to sources of error not contained in the simple-sum aggregates.

The MSI require information that is often incomplete or unavailable. Consequently, certain explicit (or in some cases, implicit) assumptions are made that may render them less useful as intermediate policy targets. First, they use information on the own rate of interest on each component. In many cases, actual data are unavailable so they must be assumed, estimated or set equal to some ceiling rate. For example, the rates on passbook savings deposits at mutual savings banks and savings and loans are assumed to be at their ceiling rates, while the rate on demand deposits held by businesses are proxied by the rate on directly placed finance company commercial paper, adjusted for reserve requirements.

The own rate of return on all currency and demand deposits held by households is assumed to be zero. At first, this may seem inappropriate because the own rate of return to holding currency is the negative of the expected rate of inflation. This assumption is appropriate, however, as long as the interest rate on the pure store-of-wealth asset (Moody's series of seasoned Baa bonds) also reflects expectations of inflation. Nevertheless, changes in inflationary expectations may distort the measure of monetary services associated with other components, because many of these rates are set at ceiling levels that will not respond rapidly to changing expectations of inflation. Hence, the estimate of the user cost may erroneously change with changes in expectations of inflation. This assumption, however, is less appropriate in the case of demand deposits, because such deposits may yield some explicit return.

Furthermore, the theoretical model on which these aggregates are based requires that all yields be for an equivalent holding period. As a result, all assets are converted to a one-month holding period yield by a Treasury securities yield curve adjustment. Moreover, the reference rate that determines the user cost is the maximum of the Baa corporate bond rate and the rates on the assets contained in the aggregate. Therefore, the user costs are sensitive to changes in the yield curve. In addition to these, a number of other estimations and assumptions are made (see Farr and Johnson (1985)).

Likewise, Spindt's MQ measure is based on a number of assumptions necessitated by measurement problems. For example, no turnover statistics are available for either currency or travelers checks and the turnover statistics for the other components are *gross* turnover, not final product (GNP) turnover, as is necessary to be consistent with the underlying theory. As a result, a number of assumptions and estimates are made to generate the final product turnover rates used in the construction of MQ (see Spindt (1983)).

The extent to which these aggregates are affected by the various estimates and implicit assumptions is, of course, unknown. It could be that there exists a "law of large numbers" so that, on average, these measurement errors cancel each other. No such law, however, need exist. Consequently, the potential advantages that these aggregates might offer must be determined by statistical comparisons like those presented here. Of course, if such comparisons show little or no advantage of these aggregates over simple-sum aggregates, it suggests that we need to rethink the theory on which they are based *or* the way in which these aggregates are estimated.

Table 1

Weights For Calculating Growth Rates of the Aggregates (× 100)

	M1			MQ				MSI4				
Year	CTC	DD	OCD1	CTC	DD	OCD1	OCD2	CTC	DD	OCD1	OCD2	OTHER
1970	23.0	76.9	0.1	45.3	54.7	0.0	0.0	12.7	23.4	0.0	0.0	63.9
1971	23.2	76.8	0.1	44.8	55.2	0.0	0.0	11.7	27.0	0.0	0.0	61.3
1972	23.1	76.8	0.1	43.4	56.6	0.0	0.0	11.7	27.4	0.0	0.0	61.0
1973	23.4	76.5	0.1	40.5	59.5	0.0	0.0	13.4	24.3	0.0	0.0	62.2
1974	24.5	75.4	0.1	37.5	62.5	0.1	0.0	13.6	23.1	0.0	0.0	63.3
1975	25.7	74.1	0.2	36.8	63.0	0.1	0.1	10.5	21.2	0.1	0.2	68.1
1976	26.7	72.8	0.6	34.5	65.1	0.3	0.1	10.6	21.2	0.1	0.2	68.0
1977	27.1	71.9	1.1	32.8	66.6	0.5	0.1	11.9	21.5	0.2	0.1	66.2
1978	27.5	71.0	1.5	30.9	68.3	0.5	0.2	13.7	20.7	0.4	0.2	65.0
1979	28.1	68.1	3.8	28.6	69.5	1.1	0.8	15.9	20.4	1.3	0.4	62.0
1980	28.9	65.7	5.4	27.0	68.9	2.1	2.0	13.7	17.7	1.7	1.5	65.4
1981	29.0	55.8	15.2	24.3	63.4	9.1	3.3	15.6	15.5	5.8	1.6	61.5
1982	29.2	51.1	19.7	24.6	57.9	12.5	5.1	12.4	12.7	5.6	4.5	64.7
1983	28.8	47.5	23.7	24.9	53.5	16.7	4.8	11.3	11.3	5.4	14.3	57.7
1984	29.2	45.2	25.5	23.4	53.4	17.8	5.4	11.9	10.5	6.1	14.9	56.5

percent. Third, during 1981, the growth rates of M1 and MQ diverge dramatically, reflecting the nationwide introduction of NOW accounts. From I/1982–IV/1984, the two growth rates exhibit somewhat similar movement, although the growth rate of M1 typically exceeds that of MQ by approximately 1.5 to 2 percentage points.

An interesting feature of the growth rates is that each can be expressed as a weighted average of the growth rates of its components. Since weighting is the innovative notion behind these alternative aggregates, an investigation of these weighting schemes is an instructive way to compare MSI4 and MQ with M1. For M1, the weights are simply each component's share of M1. The weights for the MSI are each component's share of the total expenditure for monetary services. The price of the monetary services of each asset is the difference between the yield on a risk-free store of wealth and that asset's own yield. The expenditure on each component's monetary services is this interest differential times each component's quantity. Therefore, each weight is the ratio of the expenditure on each component's monetary service to the *total* expenditure on monetary services.

For MQ, the weights are each component's total turnover as a percentage of nominal GNP. In other words, each component's weight is its quantity times its final product turnover rate (i.e., its quantity-weighted velocity) as a share of the sum of these quantity-weighted velocities over the assets in the aggregate, that is, nominal GNP.

Annual averages of these weights for the period 1970–84 are presented in table 1. The weights for the assets in M1 are aggregated into three basic groups: those for (a) currency plus travelers checks (CTC), (b) demand deposits (DD), and (c) other checkable deposits (OCD1). The first three columns of weights for MQ are for the same asset groups as for M1. The fourth column (OCD2) contains the weights for the assets in MQ that are not in M1 — money market mutual fund shares, money market deposit accounts and telephone transfer savings accounts. The weights for MSI4 are organized similarly. The first three columns contain the weights for the same asset groups as are in M1; the fourth column (OCD2) contains the weights for the assets in MQ but not in M1. The fifth column (Other) includes the weights of all the other assets in MSI4.

When comparing the weighting schemes, one notices few similarities. Both the levels, as well as the patterns of movements and the relative magnitudes, are considerably different. Only two similarities emerge: The first is the general decline of the weights of demand deposits for both M1 and MSI4. Alternatively, the weight for demand deposits in MQ increases until 1980, then declines. Even after this decline, the weight for demand deposits in MQ currently

is about the same as it was at the beginning of the 1970s, while those in M1 and MSI4 are approximately 40 percent and 55 percent lower, respectively. Second, the weights of other checkable deposits in all three aggregates, while near zero during most of the 1970s, have risen dramatically in the 1980s. This rise corresponds to the increased availability of new checkable deposits with financial deregulation in the 1980s. The levels and relative magnitudes of these weights, however, differ substantially across aggregates. In particular, OCD1's weight in M1 is significantly larger than that in either MQ or MSI4. Moreover, OCD1's current weight is about 56 percent of demand deposits' weight in M1 and 58 percent in MSI4, while only about a third of demand deposits' weight in MQ.

The behavior of currency's weight across all three aggregates also has been dissimilar. Currency's weight in M1 has risen rather consistently since 1970, while doing just the opposite in MQ. Consequently, changes in the growth rate of currency now have a larger impact on the growth of M1 and a much smaller impact on the growth of MQ than earlier. In contrast, currency's weight in MSI4 has not changed appreciably. The decline in demand deposits' weight, however, has led to a situation in which currency growth has a larger impact on MSI4 than does an equivalent change in demand deposit growth, a characteristic not shared by either M1 or MQ.

By construction, MSI4 contains a large group of assets that, while liquid, cannot be exchanged directly for goods and services. It is interesting to note how large the weights of these non-medium-of-exchange assets are in MSI4. In fact, until the last two years, the weights of non-medium-of-exchange assets in MSI4 (those classified as "other" in table 1) have been 1-1/2 to 2 times larger than the weights of the medium-of-exchange assets (the sum of the first four MSI4 weights). Only in 1983 and 1984 have the weights of medium-of-exchange and non-medium-of-exchange assets approached equality. Consequently, until recently, a one percentage-point change in the rate of growth of assets that cannot be exchanged directly for goods and services had a substantially larger impact on the growth of MSI4 than did a one percentage-point change in the rate of growth of transaction balances.

INCOME VELOCITIES OF ALTERNATIVE AGGREGATES

For an aggregate to be useful as a short-run intermediate target of monetary policy, it must have a stable, predictable relationship with the goals of policy. Since the growth of nominal income is one of the principal goals of monetary policy, it is important that an aggregate's income velocity be predictable if it is to be used for short-run economic stabilization.

We begin with a simple comparison of the levels of the velocities of M1, MSI4 and MQ. These velocities, normalized to I/1970 = 1.0, are presented in chart 2.[16] The velocities of M1 and MQ follow similar patterns. Both appear to increase at a fairly constant rate until 1980, then accelerate through 1981 and decline markedly after the nationwide introduction of NOW accounts. Moreover, both have increased since mid-1983. The major difference is that the velocity of M1 was larger than that of MQ until IV/1980 and has been below it since the introduction of NOWs.[17] While MSI4 velocity has exhibited generally similar movements since the end of 1980, it grew much more slowly than either M1 or MQ velocity up to the beginning of 1978 and then considerably more rapidly from 1978 to the end of 1980.[18] Moreover, as one would expect given the composition of MSI4, its velocity is significantly lower than that of the other two aggregates, reflecting the slower turnover rate of the non-medium-of-exchange assets that are included in it.

The quarter-to-quarter growth rates of the velocities are presented in chart 3. These data indicate that the growth rates of M1 and MQ differ little over the period. Indeed, the most significant difference in the growth rates of M1 and MQ occurred in the first two quarters of 1981. The velocities of both aggregates grew rapidly during the first quarter of 1981, but the growth in the velocity of MQ (33.1 percent) was nearly double that of M1 (18.2 percent). Furthermore, the velocity of M1 declined in the second quarter of 1981, while that of MQ increased at a rate of about 1 percent. In all other cases, the turning points in growth rates of M1 and MQ velocities coincide. In contrast, the growth rate of MSI4 velocity differs from the others, being substan-

[16]The velocities for MQ and MSI4 are index numbers and, as such, have no dimension. Hence, they must be normalized to some arbitrarily chosen base period (I/1970 in this case). M1 velocity is normalized similarly to facilitate the comparisons.

[17]This is consistent with the earlier observation that simple-sum M1 growth has been rapid relative to that of MQ since the nationwide introduction of NOWs.

[18]From II/1970 to IV/1977, MSI4 velocity grew at a 0.3 percent annual rate while MQ and M1 velocities grew at 2.9 percent and 3.2 percent rates, respectively. MSI4 velocity growth accelerated to a 6.5 percent rate from I/1978 to IV/1980 while the growth of MQ and M1 velocities rose only to 3.7 percent and 3.2 percent rates, respectively.

Chart 2

Velocities of Monetary Aggregates

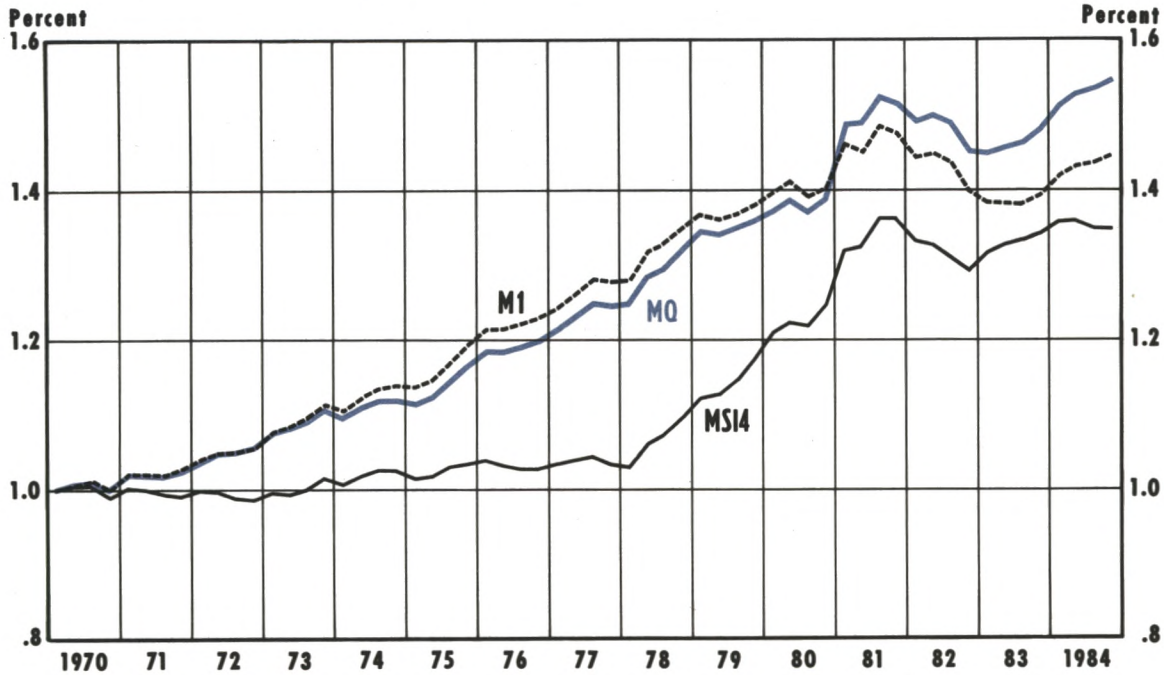


Chart 3

Growth Rate of Velocities of Monetary Aggregates

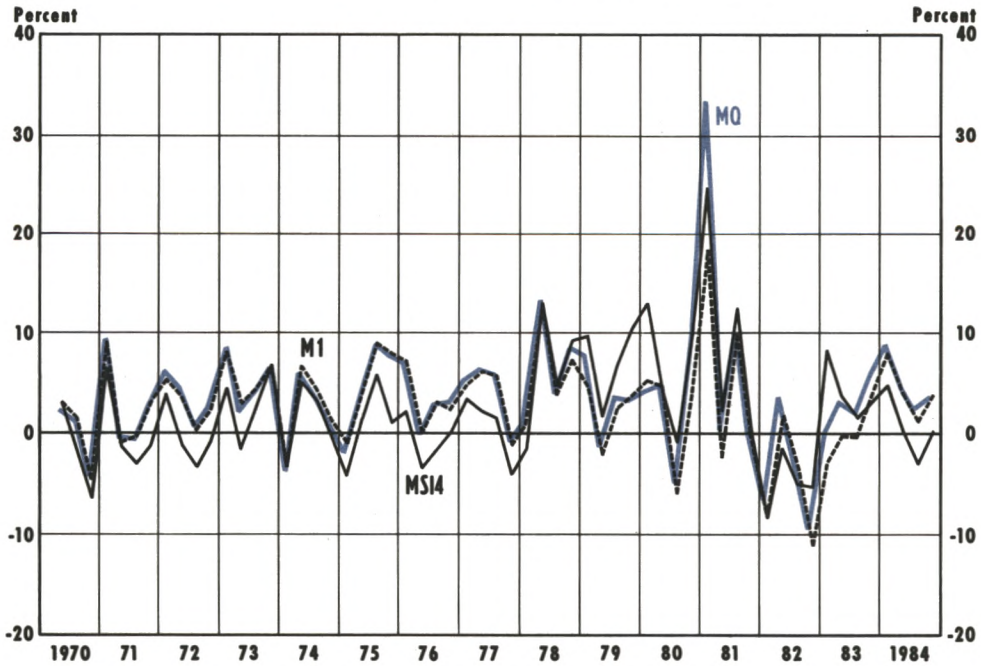


Table 2

Tests of the Hypothesis of Zero Autocorrelation: II/1970–IV/1984

Lag Length	Simple-Sum M1	MQ	MSI4	Critical χ^2 Value[1]
6	4.55	3.18	7.80	12.59
12	14.71	14.83	11.44	21.03
18	16.12	15.53	19.46	28.87
24	20.48	19.38	21.49	36.42

[1]At 5 percent significance level.

tially below them until late 1978 and above the others until late 1980. Since 1980 the growth rates of the velocity of all these aggregates have behaved similarly.

The Predictability of Velocity Growth

Studies have shown that econometric forecasts of M1 velocity growth tend to produce relatively large forecast errors. This result may be due in part to the fact that velocity growth tends to fluctuate randomly around a fixed mean, so that the expected future growth rate in M1 velocity is unrelated to its past growth rates.[19] That is to say that M1 velocity possesses no regularities that will enable it to be predicted on the basis of its own past history. If a series contains such regularities, then its past history provides some basis to predict its future, especially for a short time into the future.[20]

If the growth rates of MQ and MSI4 velocities also contain no such regularities, then they will be just as difficult to predict as M1 velocity from their own past histories, and may be just as difficult to predict from an econometric model as well. Consequently, it can be argued that a sufficient condition for MQ and MSI4 to be preferable to M1 as intermediate policy targets is that the growth rates of their velocities exhibit regularities not exhibited by M1 velocity. Of course, this finding would not preclude the possibility that these velocities could not be predicted on the basis of information not contained in the past history of the series itself. Nevertheless, if no such regularities are present, it would tend to suggest that it may be no easier to predict MSI4 and MQ velocities than it is for M1 velocity.

To test whether the growth of MSI4, MQ or M1 velocity contains such regularities, correlation coefficients between past and current values of velocity growth are calculated over the period II/1970 to IV/1984. If these correlations are not statistically significant, then past values of velocity growth do not contain information helpful in predicting current velocity growth and, hence, velocity growth cannot be predicted by its own past history. The chi-squared statistics for testing whether the correlations between past and current rates of velocity growth are different from zero for lag lengths of 6, 12, 18 and 24 quarters are presented in table 2. None of these statistics is statistically significant at the 5 percent level. Hence, the hypothesis that each of these series cannot be predicted by its own past cannot be rejected. In other words, the quarterly growth of the weighted aggregates' velocities is no more easily predicted by their own past than is the quarterly growth of M1 velocity.[21]

Since the above test indicates that the velocity growth of each of these monetary aggregates varies randomly around its mean, it would be instructive to examine whether the velocity growth of any one aggregate varies significantly less than that of the others. The means and standard deviations of the growth rates given in table 3 indicate that the standard deviation of the growth rates of velocity around their mean levels is not significantly different for any of the aggregates.[22] Indeed, the standard deviation of the growth

[19]Granger (1980) has shown that a series is essentially random if it has no predictable pattern to it. Thus, a time series, X_t, is random if the correlation between X_t and X_{t-j} is not significantly different from zero for all j.

[20]For example, see Hein and Veugelers (1983) and Nelson and Plosser (1982).

[21]This result is generally consistent with Spindt's (1985).

[22]None of the tests of the hypothesis that the variances are equal could be rejected at the 5 percent level.

Table 3

Means and Standard Deviations of the Growth Rates of Various Velocity Measures: II/1970–IV/1984

Aggregate	Mean	Standard Deviation
Simple-Sum M1	2.67	4.99
MQ	3.17	5.85
MSI4	2.21	5.76

rates is smallest for M1. Thus, the evidence suggests that the growth rates of the velocities of MSI4 and MQ do not appear to be more easily predicted nor any less variable than the growth rate of M1 velocity. Hence, these aggregates may not be better intermediate monetary targets than M1.

While the above analysis indicates that MQ and MSI4 have not been preferable intermediate targets over M1 during the II/1970 to IV/1984 period, it does not preclude that either (or both) of these aggregates may be better targets during the period of financial innovation, I/1981–IV/1984. The evidence already presented, however, implies that this is not the case. In particular, as seen in charts 2 and 3, both the level and the growth rate of each velocity behaved similarly from I/1981 to IV/1984. All three velocities fell in mid-1981 and have rebounded since early 1983. Furthermore, even though the growth of each velocity is more variable during this period than it was during the preceding one, the standard deviations across velocity growth rates are not statistically different. Like the results for the entire period, the growth of M1 velocity is the least variable over the I/1981–IV/1984 period. Consequently, there have not been any substantive changes in the relative performances of these three aggregates during the past four years.[23]

CONCLUSIONS

The introduction of new financial instruments and the recent financial deregulation have confused further the distinction between money and near-money. One response to this confusion has been the construction of two monetary aggregates as alternatives to the simple-sum measures currently reported by the Federal Reserve. These alternatives are the monetary services indexes and MQ. Each of these new aggregates is a weighted index of the same financial assets that constitute the various measures of money as currently defined. The difference between the monetary services indexes and MQ lies primarily in the weighting scheme employed to measure the monetary services provided by the assets that compose each aggregate. The monetary services indexes use opportunity costs of holding these financial assets to calculate the weights, while MQ employs the turnover rates of these assets. When investigated, these weighting schemes differed substantially across the three monetary aggregates examined.

From a policymaking viewpoint, the primary motivation for examining different monetary aggregates is to find the one most closely associated with nominal GNP. In this paper, we compared the growth and the stability of the velocity of these alternative weighted monetary aggregates with the conventional simple-sum M1. We found that the growth rate of M1 velocity was somewhat slower than that of MQ since the nationwide introduction of NOW accounts in 1981; however, there was little difference in the movements of these growth rates. Furthermore, the MQ velocity growth was neither less variable nor more predictable than that of M1.

With respect to the broadest monetary services index (MSI4), we found some significant differences in its growth rate and velocity relative to M1 and MQ; however, there was no difference in the predictability or the variability of MSI4 velocity growth. Consequently, neither MSI4 nor MQ has demonstrated any apparent gain over M1 for policy purposes, and both are more difficult to calculate.

[23]This is generally consistent with the results in Batten and Thornton (1985) who found that MQ and MSI4 did not outperform M1 in a St. Louis-type equation during the I/1981 to II/1984 period.

REFERENCES

Barnett, William A. "Economic Monetary Aggregation: An Application of Index Number and Aggregation Theory," *Journal of Econometrics* (September 1980), pp. 11–48.

Barnett, William A., and Paul A. Spindt. *Divisia Monetary Aggregates*, Staff Study No. 116 (Board of Governors of the Federal Reserve System, May 1982).

Barnett, William A., Edward K. Offenbacher and Paul A. Spindt. "The New Divisia Monetary Aggregates," *Journal of Political Economy* (December 1984), pp. 1049–85.

Batten, Dallas S., and Daniel L. Thornton. "Weighted Monetary Aggregates As Intermediate Targets," Federal Reserve Bank of St. Louis Research Paper No. 85-010 (1985).

FEDERAL RESERVE BANK OF ST. LOUIS
P.O. BOX 442
ST. LOUIS, MISSOURI 63166

Subscriber: Please include address label with subscription inquiries or address changes.

_____ . "M1 or M2: Which Is the Better Monetary Target?" this *Review* (June/July 1983), pp. 36–42.

Brown, W. W., and G. J. Santoni. "Monetary Growth and the Timing of Interest Rate Movements," this *Review* (August/September 1983), pp. 16–25.

Chetty, V. K. "On Measuring the Nearness of Near-Moneys," *American Economic Review* (June 1969), pp. 270–81.

Farr, Helen T., and Deborah Johnson. "Revisions in the Monetary Services (Divisia) Indexes of Monetary Aggregates," Mimeo, Board of Governors of the Federal Reserve System (1985).

Fisher, Irving. *The Purchasing Power of Money* (New and rev. ed., A. M. Kelley, 1963).

_____ . *The Making of Index Numbers* (Houghton-Mifflin Company, 1922).

Friedman, Milton. "The Quantity Theory of Money — A Restatement," in *Studies in the Quantity Theory of Money* (The University of Chicago Press, 1956), pp. 3–21.

Friedman, Milton, and David Meiselman. "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United States, 1897–1958," in *Stabilization Policies* (Prentice-Hall, 1963), pp. 165–268.

Friedman, Milton, and Anna Jacobson Schwartz. *Monetary Statistics of the United States* (National Bureau of Economic Research, 1970).

Granger, C. W. J. *Forecasting in Business Economics* (Academic Press, 1980).

Hafer, R. W. "Money, Debt and Economic Activity," this *Review* (June/July 1984), pp. 18–25.

_____ . "The FOMC in 1983–84: Setting Policy in an Uncertain World," this *Review* (April 1985), pp. 15–37.

Hamburger, Michael J. "The Demand for Money by Households, Money Substitutes, and Monetary Policy," *Journal of Political Economy* (December 1966), pp. 600–23.

Hein, Scott E., and Paul T. W. M. Veugelers. "Predicting Velocity Growth: A Time Series Perspective," this *Review* (October 1983), pp. 34–43.

Keynes, John Maynard. *The General Theory of Employment, Interest and Money* (Harcourt, Brace and Company, 1936).

Laidler, David. "The Definition of Money," *Journal of Money, Credit and Banking* (August 1969), pp. 508–25.

Marshall, Alfred. *Money, Credit and Commerce* (London: MacMillan and Company, 1923).

Mason, Will E. "The Empirical Definition of Money: A Critique," *Economic Inquiry* (December 1976), pp. 525–38.

Melvin, Michael. "The Vanishing Liquidity Effect of Money on Interest: Analysis and Implications for Policy," *Economic Inquiry* (April 1983), pp. 188–202.

Nelson, Charles R., and Charles I. Plosser. "Trends and Random Walks in Macroeconomic Time Series: Some Evidence and Implications," *Journal of Monetary Economics* (September 1982), pp. 139–62.

Pesek, Boris P., and Thomas R. Saving. *Money, Wealth, and Economic Theory* (The MacMillan Company, 1967).

Pigou, A. C. "The Value of Money," *Quarterly Journal of Economics* (November 1917), pp. 38–65.

Spindt, Paul A. "Money Is What Money Does: Monetary Aggregation and the Equation of Exchange," *Journal of Political Economy* (February 1985), pp. 175–204.

_____ . "Money is What Money Does: A Revealed Production Approach to Monetary Aggregation," Special Studies Paper No. 177 (Board of Governors of the Federal Reserve System, June 1983).

Thornton, Daniel L. "The FOMC in 1981: Monetary Control in a Changing Financial Environment," this *Review* (April 1982), pp. 3–22.

_____ . "Why Does Velocity Matter?" this *Review* (December 1983), pp. 5–13.