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The Effect of Federal Reserve Membership on Earnings of Fourth District Banks, 1963 - 1970

A Measure Of Monetary Policy

CONTENTS

THE EFFECT OF FEDERAL RESERVE MEMBERSHIP ON EARNINGS OF FOURTH DISTRICT BANKS, 1963–1970

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Considerable attention has been focused in recent months on the issue of membership in the Federal Reserve System. A frequently voiced view is that the reserve requirements associated with membership have a negative impact on bank earnings. This article reports on a study made of member and nonmember bank earnings in the Fourth District for the 1963-1970 period.

The study found no significant difference between the earnings of member and nonmember banks after the effects of differences in location, size, growth rate, and asset and liability composition were taken into account. This finding is contrary to the view that membership is costly to all commercial banks, but it is consistent with the rather stable membership experience of the Fourth District during the 1960's.

Inasmuch as this study was concerned with earnings of members and nonmembers as groups, however, it is possible that for some individual banks, earnings may be affected either positively or negatively by membership.

It is frequently asserted that Federal Reserve membership adversely affects the earnings of individual commercial banks. The cost of membership is thought to result principally from the stringency of Federal Reserve regulations regarding the level and composition of required reserves. That is, some state required reserve levels are lower than Federal requirements.[1] Moreover, while member bank reserves must be held in vault cash or as deposits with the Federal Reserve, many state chartered nonmembers are permitted to count interest-earning assets as reserves.

Professor Lucille S. Mayne has offered evidence that membership does impose a burden on member banks.[2] After examining the earnings of member and nonmember banks in Illinois during 1961-1963, she concluded:

> ...the injurious effect of Federal Reserve membership on the ultimate measure of profitability, after-tax return on equity, is not restricted merely to the smallest banks but extends through all size classes and is statistically significant, in specific instances, among banks with $2 million to under $25 million in deposits.[3]

The present work subjects the "membership is costly" hypothesis to additional testing on the basis of the experience of Fourth District commercial banks for the years 1963-1970.

GENERAL APPROACH OF STUDY

The objective is to measure the effect of Federal Reserve membership on net income; i.e., net of all operating expenses, provisions for or actual loan losses, securities transactions, and taxes. Final earnings are considered the appropriate measure of profitability on the assumption that this is the profit figure pertinent to a bank's membership decision. That is, it is irrelevant whether or not member and nonmember bank earnings happen to be different before securities gains and losses, safe deposit earnings or taxes if, after all charges that are customarily involved in banking, their earnings are not different. Additionally, Professor Mayne found differences in the earnings of members and nonmembers to be greatest when earnings net of securities transactions and taxes were compared.[4]

A multiplicity of factors affects the net income of commercial banks. Fundamentally, these factors include the nature of demand facing a bank, the prices the bank must pay for factors of production, and the technology employed. These basic determinants of bank profitability are related to the size of the bank, its location, the size and location of its competitors, its rate of growth, and the regulatory structure to which it is subject.

In order to isolate the effect of Federal Reserve membership on bank earnings, it is necessary to take into account the impact of all other contributory factors. To illustrate the importance of taking other influences into account, a simple comparison of the average earnings of all member

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[1] The U. S. banking system is a "dual" one. Banks may be chartered by either Federal or state banking authorities. The U. S. Comptroller of the Currency charters national banks, which are required to join the Federal Reserve System. State chartered banks may choose to be nonmembers and, hence, to be subject to state reserve requirements.

[2] Lucille Stringer Mayne, *The Effect of Federal Reserve System Membership on the Profitability of Illinois Banks, 1961-1963,* (University Park, Pennsylvania: Pennsylvania State University, 1967).

[3] *Ibid,* p. 132.

[4] *Ibid,* p. 130.

and nonmember banks reveals that member earnings are much higher. However, if one examines the relative size of member and nonmembers, it is apparent that member banks on average are much larger—and larger banks have higher absolute earning levels. Meaningful comparisons, therefore, require consideration be given to all causes of variations in earnings. Yet, at the same time, one must avoid separately accounting for those factors through which membership has an effect. For example, if membership is thought to reduce earnings via the impact on cash holdings, the effect of cash holdings on profits should not be separated from the effect of membership itself.

Ideally, one would like to have a complete list of independent, directly measurable variables that jointly determine each bank's profit performance. Practically, it is impossible to take all variables that influence the earnings outcome into account; some variables cannot be measured, e.g., community goodwill towards a bank; many of the determinants lack independence in the sense of unilaterally causing an outcome, e.g., high salaries may be a cause or an effect of profits; and some variables are not independent of one another but jointly represent some other cause, e.g., the ratios of cash to deposits and securities to deposits may both reflect bank regulation. Necessary compromise between the ideal and practical requires the analyst to select a manageable number of measurable variables that are considered to represent the most important determinants of bank profit. In this study, a number of such variables have been chosen for inclusion in regression analysis.

Regression is a statistical technique[5] useful in measuring the relationship between variables. The process enables one to obtain estimates of the impact of each of the designated independent variables on the dependent variable—in this case, bank net income.

Regression analysis also permits one to make statements about the confidence that may be attached to an estimate of the relationship between an independent variable and the dependent variable. In particular, it is desirable to know with some specified degree of probability if the impact of the independent variable differs from zero. In the present study, if an estimated impact differs from zero with 95 percent confidence, the variable is considered to be a statistically significant determinant of net income. Special attention is given to the significance of the estimated impact of Federal Reserve membership on bank earnings.

INDEPENDENT VARIABLES EMPLOYED

Membership. Federal Reserve membership is thought to penalize earnings of member banks in two ways: first, through higher reserve ratios than those required by states and second, by the provision that member reserves be held in nonearning assets, i.e., vault cash and deposits with the Federal Reserve. In fact, many state administered reserve requirements are higher than Federal Reserve requirements.[6]

For example, Ohio reserve requirements at the end of 1970 were 12 percent on demand deposits and 6 percent on time deposits. Federal Reserve requirements for country banks at that time were 12 1/2 percent on the first $5 million of demand

[5] An introduction to regression that employs neither calculus nor matrix algebra may be found in *Econometrics,* by Thomas H. Wonnacott and Ronald J. Wonnacott, (New York: John Wiley and Sons, 1970) Chs. 1-3.

[6] Andrew F. Brimmer, Member of the Board of Governors of the Federal Reserve System, "The Rationalization of Commercial Bank Reserve Requirements," Paper presented to the 67th Annual Convention of the National Association of Supervisors of State Banks, April 4, 1968.

deposits (13 percent thereafter) but 3 percent on savings deposits and the first $5 million of time deposits (5 percent thereafter). However, nonmember banks in many states, including the Fourth District states of Kentucky, Ohio, and Pennsylvania are permitted to hold some portion of reserves in the form of earning assets. Again using Ohio as an example, 60 percent of reserves for time deposits may consist of securities issued or guaranteed by the U. S. Government. (For a more detailed comparison of the various Fourth District reserve requirements in effect during 1963-1970, see Appendix.)

Location. A bank's profitability in the short-run will be influenced by its location. Different localities have different demands for bank services, both with respect to level and composition. The degree of competition among banks may also vary by market areas. In addition, the cost of doing business is higher in urban regions than in rural areas. However, there is a force at work that, over time, tends to moderate differences in bank earnings stemming from such causes. As the economy grows, and its spatial composition changes, new banks are established and new branches of existing banks are opened. While the opening of a new bank or branch requires approval of the regulatory authorities, requests for new charters and permission to branch tend to be concentrated in high earnings markets, where the competitive effect will be to reduce earnings toward the norm.

Differences in state regulations may also cause earnings differentials. For example, state laws that apply with equal force to member and nonmember banks specify legal interest rate ceilings—"usury laws," govern the establishment of branches,[7] and prescribe the organizational structure of banks. These laws—as in the case of state reserve requirements—lack uniformity. During the credit squeeze of 1969, for example, the interest rate ceiling on home mortgages in Ohio and West Virginia was 8 percent, the Kentucky maximum contract rate was 8 1/2 percent, while the Pennsylvania limit was 6 percent. Moreover, Pennsylvania permits contiguous county branching, Ohio has county-wide branching, Kentucky has a modified county branching law, and West Virginia prohibits branching. Similarly, multi-bank holding companies are not allowed in Pennsylvania, West Virginia or Kentucky,[8] but have existed in Ohio since 1929.

Bank Size. The quantity of assets held by a bank is an important determinant of the level of bank earnings. As holdings of assets increase, other things equal, the gross and net income derived from these assets also increases. However, it is not clear that earnings increase in direct proportion with bank size—especially over the wide range of bank sizes observed in the Fourth District. Economies or diseconomies of scale may be encountered. In order to avoid the problems of estimation that are encountered where such economies or diseconomies exist and to generally increase the homogeneity of the samples, this analysis is carried out on fairly narrow size groupings of banks: Group I, total assets under $5 million; Group II, total assets of $5 to $10 million; Group III, total

[7] For a study that examines the effects of branching on bank cost, see Frederick W. Bell and Neil B. Murphy, *Economies of Scale in Commercial Banking,* (Boston: Federal Reserve Bank of Boston, 1967).

[8] A Louisville-based bank holding company with two banks was formed in 1925 and is exempt from the present prohibition under a grandfather clause.

assets of $10 to $20 million; Group IV, total assets of $20 to $30 million; Group V, total assets of $30 to $50 million; and Group VI, total assets of $50 million to $100 million.[9]

Bank Growth. The rate at which a bank's size is increasing may affect its earnings, although the direction of impact is somewhat ambiguous. For example, if bank growth occurs because of an increase in demand for banking services, the contemporaneous effect of growth on earnings seems likely to be positive. The effect of "bootstrap" growth at the expense of one's competitors because of price and service concessions, however, is likely to be quite different. Perhaps, the statistical difficulty of distinguishing these kinds of growth account for the sparsity of evidence regarding the impact of growth on bank profits.[10]

Asset Composition. It is often asserted that the make-up of a bank's asset holdings exerts a powerful influence on its earnings. High-performance banks are associated with a high proportion of instalment loans (if the bank serves a retail clientele) or commercial and industrial loans (if the bank is large enough to enter such a market). Generally, loans are thought to be more profitable than securities.

Yet, accounting estimates of net rates of return earned on investments and loans by banks participating in the Federal Reserve Functional Cost Analysis (FCA) program conflict with the assumption that loans are always more profitable than investments.[11] According to FCA *Average Banks* reports, the net rate of return on investments exceeded the return on loans for all bank size categories in 1969 and 1970 and for two out of three bank size categories in 1968.

Liability Composition. The ratio of time and savings to total deposits is also thought to have a major impact on bank earnings, since interest-bearing deposits are much more costly to a bank than demand deposits.[12]

EQUATION TO BE ESTIMATED

In comparing the earnings of member and nonmember banks, consideration will have to be given to the effects of location (by state), size, the pace at which individual banks are growing, and the ratios of loans to investments and time and savings deposits to total deposits. These influences on bank earnings may be accounted for

[9] Homogeneous size groupings are also useful in dealing with the econometric problem of heteroscedasticity.

[10] Mayne, *op. cit.*, Ch. 8 and Lyle E. Gramley, "Growth and Earnings at Individual Commercial Banks," *Essays on Commercial Banking,* (Kansas City: Federal Reserve Bank of Kansas City, 1962), pp. 9-19.

[11] Functional Cost Analysis, *Average Banks,* 1966-1970. Functional Cost Section, Federal Reserve Bank of Cleveland. The FCA estimates do not include any adjustment for the effect of compensating balances on net rates of return, but Professor Mayne, *op. cit.,* Ch. 8, also found evidence consistent with hypothesis that the net rate of return on investments exceeded that on loans for Illinois banks in 1961-1963.

[12] See for example, "The Cost of Demand Deposits, 1969-1970" *Economic Commentary*, Federal Reserve Bank of Cleveland, August 23, 1971 and "The Profitability of Time Deposits—A Functional Cost Approach," *Economic Commentary,* Federal Reserve Bank of Cleveland, October 25, 1971.

and the impact of membership measured by estimating the following equation:

$$NI_i = a_o + a_1 M_i + a_2 O_i + a_3 P_i + a_4 K_i + a_5 TA_i + a_6 G_i + a_7 L/I_i + a_8 TS/TD_i + e_i$$

where the terms are defined as follows:

NI_i = net income after loan losses, securities gains and losses and taxes, the i^{th} bank in thousands of dollars.

M_i = an index variable for membership taking on the value 1 for member banks and 0 for non-member banks.

O_i = a dummy variable for Ohio where if a bank is located in Ohio, $O_i = 1$; otherwise $O_i = 0$.

P_i and K_i similarly are dummies for banks located in Pennsylvania and Kentucky. West Virginia banks constitute the standard against which banks in other states are compared.

TA_i = the average of total assets for the i^{th} bank in a given year. TA_i for the t^{th} year is calculated by adding total assets reported at the end of December t-1 to total assets at the end of December t to twice total assets reported in June t and dividing by four.

G_i = the annual percent change in total assets for the i^{th} bank. G_i for the t^{th} year is calculated by subtracting total assets reported in December t-1 from total assets reported in December t and dividing the results by December t-1 total assets.

L/I_i = the ratio of loans to investments for the i^{th} bank as reported on the December call report.

TS/TD_i = the ratio of time and savings deposits to total deposits for the i^{th} bank as reported on the December call report.

e_i = an error term reflecting the effect of errors in measurement and omitted independent variables.

DATA EMPLOYED

The equation was estimated for each year, 1963-1970 inclusive, for groups of banks that together constitute nearly all insured banks located in the Fourth Federal Reserve District. The following insured banks were excluded:

- those opening for business since 1960
- those with incomplete data
- those with total assets of $100 million or more.

New banks were excluded from the analysis on the grounds that the earnings performance of a new bank is substantially different from that of an established bank. Involvement in a merger and a change of member-nonmember status were the main reasons for incomplete data. The largest banks in the District were excluded because of the desire to restrict the regressions to rather narrow size ranges of banks in order to maintain the homogeneity of the sub-samples and because the small number of banks with assets over $100 million. The number of banks in each bank group for each year, after these deletions, is reported with the regression results.

REGRESSION RESULTS

The coefficient estimates and summary statistics by year and size group are presented in Tables I-VI. The most important aspect of these results for this study is the failure of the analysis to detect any systematic influence of membership on net earnings of commercial banks in the Fourth Federal Reserve District during the years 1963-1970. The estimate of the coefficient for the membership variable is significantly different from zero at the 95 percent confidence level in only 5 of 48 cases. In two of those instances, the sign of the coefficient is positive (Group IV banks in 1964 and 1967), meaning that member banks had higher earnings than non-members. The three negative and significant coefficients are observed for the two smallest bank-size groups in 1966 and 1967 (Group II) and 1968 (Group I). Of the 48

TABLE I

Net Income Regression Results for Fourth District Banks With Assets Less Than $5 Million (Group I)
1963-1970

	1963	1964	1965	1966	1967	1968	1969	1970
Membership	1.596	.103	−.891	.170	−3.555	−4.234*	−.157	.481
	(1.260)	(1.459)	(1.568)	(1.507)	(1.873)	(1.740)	(2.348)	(3.899)
Ohio	−4.605	−2.835	−6.379	−11.897**	9.573*	−2.647	1.708	−2.547
	(3.147)	(3.772)	(4.075)	(3.875)	(4.781)	(4.147)	(5.551)	(9.624)
Pennsylvania	−1.364	−.009	2.409	−7.932	10.901	3.931	10.604	5.614
	(3.617)	(4.310)	(4.664)	(4.524)	(5.657)	(4.990)	(6.577)	(11.336)
Kentucky	−3.959	−4.857	−8.821*	−10.847**	6.054	−6.139	−1.403	−13.179
	(3.319)	(3.900)	(4.123)	(3.891)	(4.870)	(4.343)	(5.875)	(10.000)
Total assets	.00753**	.00806**	.00833**	.00813**	.01003**	.00912**	.01191**	.01301**
	(.00049)	(.00058)	(.00064)	(.00060)	(.00074)	(.00067)	(.00097)	(.00163)
Growth	−7.404	22.316*	3.567	7.133	34.051*	1.020	6.041	3.151
	(6.851)	(9.850)	(11.539)	(8.484)	(13.121)	(10.981)	(14.698)	(13.991)
Loans/Investments	−1.234	−2.322*	−2.114*	−2.487**	−1.637*	−.516	1.077	−5.989**
	(.917)	(.951)	(.835)	(.715)	(.779)	(.994)	(.888)	(1.814)
Time and savings deposits/Total deposits	−12.441**	−13.922**	−22.087**	−15.513**	−21.343**	−23.505**	−42.059**	−49.868**
	(3.630)	(4.205)	(4.823)	(4.361)	(5.435)	(4.971)	(6.964)	(11.174)
Intercept	10.290	10.970	17.981	21.466	−.868	16.432	13.672	30.774
Standard error of estimate	10.840	11.910	12.055	10.887	12.684	11.055	13.928	20.560
R^2	.45	.42	.43	.48	.47	.50	.52	.44
Mean of dependent variable	20.973	23.482	22.362	23.970	26.411	27.906	33.363	32.053
n	367	334	290	263	236	213	179	151

NOTE: Standard errors of the coefficients are in parentheses.
* Significant at 95% confidence level.
** Significant at 99% confidence level.

Source: Federal Reserve Bank of Cleveland

estimates of the effect of membership, only 20 are negative. Eleven of the 20 negative impact cases occur in Groups I and II. This evidence is consistent with the hypothesis that Federal Reserve membership has no effect on bank earnings. Yet, because of the concentration of negative signs in Groups I and II and of positive signs in Groups III-VI, the likelihood that membership is costly decreases with bank size.

THE EFFECT OF VARIABLES OTHER THAN MEMBERSHIP

Location by State. The conjecture regarding the effect of diversity in state regulations was found to be without substantial empirical support. There was some irregular tendency for West Virginia and Pennsylvania banks to achieve higher earnings than those located in Ohio and Kentucky. The preponderance of negative signs of the state dummies (89 out of 120 cases) reflects the higher earnings of West Virginia banks, and the size and sign of the Pennsylvania dummy relative to the Ohio and Kentucky variables indicates the somewhat better earnings record of banks located in Pennsylvania. However, only 14 of the state variable coefficient estimates are significantly different from zero. The state variables were omitted from the Group VI regressions because some Fourth District portions

TABLE II

Net Income Regression Results for Fourth District Banks
With Assets From $5 Million to Less Than $10 Million (Group II)
1963-1970

	1963	1964	1965	1966	1967	1968	1969	1970
Membership	−3.656	1.173	−6.108	−8.265*	−8.393*	−4.383	−3.366	−.486
	(3.059)	(3.052)	(3.725)	(3.933)	(3.914)	(3.883)	(4.378)	(4.238)
Ohio	6.146	2.594	5.684	−10.609	12.263	−15.723	3.217	−2.699
	(9.570)	(10.412)	(11.369)	(11.210)	(11.296)	(10.910)	(12.239)	(10.283)
Pennsylvania	14.015	12.308	12.104	−14.615	19.773	−15.387	12.206	−5.559
	(9.966)	(10.855)	(12.098)	(12.146)	(12.223)	(11.885)	(13.745)	(12.025)
Kentucky	−.204	2.618	4.061	−13.723	3.565	−12.182	4.548	−4.002
	(9.749)	(10.711)	(11.763)	(11.629)	(11.652)	(10.967)	(12.396)	(10.862)
Total assets	.00508**	.00564**	.00472**	.00460**	.00369**	.00683**	.00883**	.00929**
	(.00102)	(.00103)	(.00131)	(.00138)	(.00128)	(.00132)	(.00144)	(.00142)
Growth	6.569	−40.720	−6.505	54.794	33.865	15.021	−50.830	6.057
	(24.758)	(24.966)	(26.953)	(31.642)	(30.190)	(31.178)	(32.624)	(25.398)
Loans/Investments	−.640	−.498	−3.893	−2.832	−5.008	−10.584**	−5.323	−5.579**
	(1.928)	(1.742)	(2.222)	(2.865)	(2.943)	(2.823)	(2.736)	(2.094)
Time and savings deposits/Total deposits	−35.025**	−28.549*	−31.054*	−13.837	−31.490*	−26.727	−48.021**	−54.337**
	(11.539)	(10.920)	(13.249)	(14.610)	(15.285)	(15.790)	(17.146)	(16.481)
Intercept	26.027	28.660	36.360	42.941	45.678	56.812	44.523	51.201
Standard error of estimate	20.585	20.237	24.701	26.438	26.161	24.969	28.315	27.574
R^2	.18	.22	.12	.11	.11	.26	.26	.29
Mean of dependent variable	48.025	53.800	48.515	51.955	56.846	60.375	70.184	75.086
n	199	195	200	202	202	184	185	185

NOTE: Standard errors of the coefficients are in parentheses.
* Significant at 95% confidence level.
** Significant at 99% confidence level.

Source: Federal Reserve Bank of Cleveland

of states did not have any banks in this size range for some of the years.

Total Assets. Bank size as measured by total assets proved to be a highly significant determinant of the level of bank earnings within size groupings. The coefficients range from a low of 0.3 percent (recorded by Group III banks in 1968) to a high of 1.3 percent (Group I banks in 1970). There was some tendency for the total assets coefficient to increase with bank size.

Growth. This study finds no evidence of a constant relationship between bank growth and bank earnings. The growth coefficient appears to be highly unstable both in size and sign. The coefficient is negative in 22 out of 48 cases. Moreover, the value is significantly different from

TABLE III

Net Income Regression Results for Fourth District Banks
With Assets From $10 Million to Less Than $20 Million (Group III)
1963-1970

	1963	1964	1965	1966	1967	1968	1969	1970
Membership	3.702	11.192	10.545	9.487	7.367	−11.828	−1.730	−5.008
	(7.579)	(7.274)	(6.456)	(6.987)	(7.202)	(19.672)	(7.292)	(6.368)
Ohio	−44.494	−48.530	−28.380	−.086	30.879	−50.881	−3.365	8.122
	(30.362)	(30.756)	(22.575)	(29.358)	(28.719)	(70.535)	(24.000)	(24.509)
Pennsylvania	−33.505	−29.720	−28.670	8.217	45.923	−34.975	30.353	29.520
	(31.081)	(31.301)	(23.168)	(30.004)	(29.498)	(73.231)	(25.209)	(25.347)
Kentucky	−43.311	−34.933	−34.262	−10.954	14.450	−39.485	−6.380	−4.949
	(31.400)	(31.628)	(23.752)	(30.373)	(29.391)	(72.673)	(24.814)	(24.991)
Total assets	.00659**	.00697**	.00751**	.00457**	.00717**	.00313	.00830**	.01117**
	(.00133)	(.00125)	(.00107)	(.00112)	(.00119)	(.00350)	(.00126)	(.00112)
Growth	−92.639	−15.664	.0003	85.755	22.145	625.041**	−36.125	69.267
	(62.087)	(64.261)	(.002)	(51.311)	(46.247)	(158.927)	(68.181	(43.811)
Loans/Investments	1.005	1.265	−3.033	−8.892*	−11.139*	−87.376**	−11.102*	−20.679**
	(4.707)	(4.751)	(3.906)	(4.463)	(5.079)	(15.663)	(5.730)	(4.915)
Time and savings deposits/Total deposits	−76.076**	−93.911**	−93.698**	−62.800*	−47.552	67.255	−115.100**	−54.854
	(27.713)	(27.134)	(27.066)	(29.852)	(30.051)	(88.433)	(33.965)	(29.348)
Intercept	84.238	89.998	71.123	72.910	13.885	124.161	94.866	32.567
Standard error of estimate	41.635	41.856	38.042	40.995	39.908	119.580	46.157	41.394
R^2	.24	.29	.32	.20	.31	.23	.32	.48
Mean of dependent variable	91.201	102.414	98.686	101.175	109.547	96.813	122.153	138.492
n	154	162	172	171	159	166	183	187

NOTE: Standard errors of the coefficients are in parentheses.

* Significant at 95% confidence level.
** Significant at 99% confidence level.

Source: Federal Reserve Bank of Cleveland

zero at the 95 percent confidence level in only 6 cases (4 with a positive sign and 2 negative).

Asset Composition. The ratio of loans to investments in bank portfolios appears as an often significant determinant of the level of bank earnings, but with a coefficient sign that defies a widely held view that loans are more profitable than investments. Out of 48 cases, there are 33 negative signs. But more importantly, in every instance (15) in which the coefficient is significantly different from zero, it is also negative. This evidence is consistent with the hypothesis that the net rate of return on securities is at times higher than that on loans, at least for banks with less than $100 million in total assets. This may result from the higher costs of making, servicing, collecting and absorbing losses on loans. The tax-exempt status of some security holdings is another factor

TABLE IV

Net Income Regression Results for Fourth District Banks
With Assets From $20 Million to Less Than $30 Million (Group IV)
1963-1970

	1963	1964	1965	1966	1967	1968	1969	1970
Membership	35.903	53.590*	11.988	33.604	42.379**	−27.610	−37.653	8.338
	(25.139)	(19.932)	(17.864)	(20.361)	(14.866)	(16.910)	(19.069)	(16.693)
Ohio	−44.186	−90.619	−24.460	−72.629	−92.765**	−53.148	−44.321	−84.025*
	(64.263)	(56.104)	(52.881)	(51.118)	(34.926)	(50.780)	(45.602)	(37.900)
Pennsylvania	−.215	−44.995	7.650	−9.459	−81.450*	−36.679	−12.350	−62.926
	(64.844)	(56.651)	(52.411)	(54.576)	(38.059)	(53.412)	(49.137)	(41.746)
Kentucky	−125.597	−102.186	−53.495	−130.035*	−51.044	−42.837	1.827	−111.881**
	(76.583)	(63.293)	(60.665)	(59.832)	(40.542)	(54.616)	(51.810)	(42.049)
Total assets	.00421	.00579*	.00585*	.00880**	.01063**	.00503	.00897*	.01095**
	(.00425)	(.00280)	(.00252)	(.00327)	(.00284)	(.00289)	(.00361)	(.00278)
Growth	−36.443	−139.849	−402.748*	290.405	−100.761	−5.019	289.184	−6.107
	(131.944)	(132.840)	(162.309)	(177.656)	(130.936)	(111.625)	(176.669)	(111.747)
Loans/Investments	12.431	26.157	−2.564	13.856	2.911	−15.119	−19.736	−18.589*
	(17.753)	(18.183)	(12.298)	(11.503)	(9.878)	(12.086)	(13.511)	(9.114)
Time and savings deposits/Total deposits	−203.137	−107.318	−31.563	−198.175*	−43.003	−245.465**	−99.483	−263.779**
	(154.775)	(92.731)	(77.475)	(94.502)	(70.612)	(78.165)	(85.370)	(80.153)
Intercept	162.974	104.069	97.315	79.568	22.732	300.904	139.398	234.037
Standard error of estimate	57.198	47.875	45.686	65.231	55.406	68.622	75.339	69.064
R^2	.30	.33	.41	.38	.41	.24	.24	.36
Mean of dependent variable	163.195	170.201	169.978	180.868	184.177	181.442	223.138	240.449
n	36	40	44	53	68	86	80	87

NOTE: Standard errors of the coefficients are in parentheses.

* Significant at 95% confidence level.
** Significant at 99% confidence level.
Source: Federal Reserve Bank of Cleveland

producing the negative sign.[13]

[13] James W. Leonard ("Federal Reserve Membership and Discrimination—A Comment," *Journal of Finance,* XX, September 1965, pp. 483-484) and others have argued that if member banks are required to hold greater than desired ratios of cash to total assets, they will adjust the liquidity of their portfolios to the desired level by reducing liquid security holdings and increasing their holdings of illiquid loans. Thus, the ratio of loans to investments will be positively associated with membership. If such a relationship exists one possible consequence would be for the loan/investment variable to "pick up" some of the effect of membership on earnings and, reduce the significance of the membership variable.

However, for Fourth District banks during 1963-1970, the relationship between membership and the loan/investment ratio was not strong as indicated by the sample correlation coefficients calculated for the two variables and shown below:

	1963	1964	1965	1966	1967	1968	1969	1970
Group I	−.03	.00	.02	.03	.06	.11	.02	.10
Group II	−.02	−.03	−.02	.03	.02	.00	.10	−.04
Group IV	−.63	−.02	.16	.20	.00	.13	.19	.14

Consequently, when the relationship between net income and its postulated determinants (excluding loan/investment) was re-estimated for Group I banks, almost identical results were obtained. Specifically, there were no changes in either the signs or the significance of the membership dummy.

Related to this, in some trial regressions of *operating revenue* on the postulated determinants of net income for Group I banks, the membership variable was negative in each case and significant (at 5%) in 1963, 1966, and 1968.

TABLE V

Net Income Regression Results for Fourth District Banks
With Assets From $30 Million to Less Than $50 Million (Group V)
1963-1970

	1963	1964	1965	1966	1967	1968	1969	1970
Membership	55.332	39.623	−7.240	13.892	9.983	51.410	−8.768	43.372
	(30.970)	(31.119)	(26.470)	(38.079)	(32.658)	(45.749)	(32.083)	(43.171)
Ohio	−40.223	−108.514	−124.679	−248.546*	−131.768	−122.130	−124.535	−115.587
	(63.362)	(79.058)	(65.396)	(98.278)	(91.700)	(75.162)	(63.346)	(87.284)
Pennsylvania	−35.614	−9.563	−18.946	−212.314*	−86.107	−105.574	−20.316	−116.891
	(64.681)	(80.040)	(67.231)	(102.113)	(93.939)	(78.133)	(72.004)	(94.076)
Kentucky	−15.744	−154.974	−92.072	−277.635*	−180.988	−133.111	−175.543*	−303.661**
	(75.890)	(91.603)	(70.192)	(107.030)	(103.778)	(82.424)	(72.360)	(97.766)
Total assets	.00571*	.00877**	.00722**	.00845**	.00572*	.00773*	.01096**	.00651*
	(.00221)	(.00259)	(.00179)	(.00292)	(.00224)	(.00284)	(.00217)	(.00280)
Growth	−144.479	−11.496	−50.081	−113.110	−378.179*	151.748	−24.282	377.715*
	(265.729)	(315.198)	(200.780)	(382.888)	(166.327)	(239.776)	(194.069)	(173.984)
Loans/Investments	22.728	−.424	5.176	11.917	−33.740	19.926	−54.024**	−61.589*
	(19.591)	(19.771)	(17.814)	(27.869)	(23.534)	(25.366)	(18.540)	(25.580)
Time and savings deposits/Total deposits	−386.615**	−332.913**	−136.085	−186.531	−114.978	−296.700	−121.978	−477.669*
	(117.156)	(118.847)	(119.003)	(227.133)	(143.393)	(161.570)	(129.361)	(193.914)
Intercept	182.748	159.419	160.427	269.940	341.912	205.093	217.972	584.581
Standard error of estimate	57.525	71.807	60.912	90.465	84.261	90.195	82.285	113.069
R^2	.66	.57	.54	.41	.42	.32	.57	.49
Mean of dependent variable	231.698	262.530	267.487	268.343	275.112	306.477	335.397	377.365
n	33	34	37	38	45	42	53	55

NOTE: Standard errors of the coefficients are in parentheses.

* Significant at 95% confidence level.

** Significant at 99% confidence level.

Source: Federal Reserve Bank of Cleveland

Liability Composition. The ratio of time and savings deposits to total deposits is confirmed as a significant factor affecting bank earnings. In 47 out of 48 cases, the estimate has a negative sign; and in 29 of those instances, the coefficient is significantly different from zero at the 95 percent confidence level.

CORROBORATIVE EVIDENCE

Given the above failure to identify a systematic cost of Federal Reserve membership, one is left with a choice of conclusions: either this study is seriously flawed or the general belief that Federal Reserve membership is costly for all member banks is wrong.[14]

[14] A study that finds net benefits in membership for Alabama banks is John G. Fulmer, Jr., "An Investigation into the Effects of Federal Reserve System Membership of Individual Commercial Banks" (unpublished Ph.D. dissertation, Graduate School of Business, University of Alabama, 1970).

TABLE VI

Net Income Regression Results for Fourth District Banks
With Assets from $50 Million to Less Than $100 Million (Group VI)
1963-1970

	1963	1964	1965	1966	1967	1968	1969	1970
Membership	277.067	102.969	−69.210	−74.224	38.760	171.267	58.022	78.241
	(141.690)	(71.020)	(77.360)	(117.749)	(77.018)	(101.826)	(81.408)	(62.927)
Total assets	.00801**	.00672**	.00795**	.00785*	.00666*	.00661	.00973**	.01009**
	(.00147)	(.00159)	(.00250)	(.00362)	(.00266)	(.00362)	(.00306)	(.00246)
Growth	344.570	−184.226	−923.269	1827.415	690.490	510.587	570.833	−226.390
	(699.323)	(482.199)	(959.695)	(1202.917)	(632.184)	(763.226)	(735.433)	(477.546)
Loans/Investments	47.902	55.754	61.824	−91.495	−104.775	−61.580	−50.528	10.165
	(75.992)	(62.500)	(70.748)	(91.396)	(60.998)	(79.754)	(54.182)	(44.988)
Time and savings deposits/Total deposits	−315.066	−385.098	−651.723	−632.460	−1033.013**	−1106.194*	−694.191*	−844.564**
	(253.544)	(276.377)	(314.810)	(482.814)	(266.153)	(421.893)	(326.423)	(253.024)
Intercept	−321.784	7.126	315.690	378.134	739.257	646.456	384.356	383.722
Standard error of estimate	96.381	116.045	151.574	260.200	162.700	271.825	218.575	162.705
R^2	.82	.60	.50	.29	.60	.31	.34	.46
Mean of dependent variable	452.294	443.300	462.682	445.097	509.448	498.150	628.805	638.237
n	17	20	22	31	29	40	41	38

NOTE: Standard errors of the coefficients are in parentheses.

* Significant at 95% confidence level.
** Significant at 99% confidence level.

Source: Federal Reserve Bank of Cleveland

One possible defect in the present study is that the conclusion may depend on compensating errors introduced by the inclusion of banks from several states in the sample. That is, given the diversity of state regulations, membership may be costly in some states and profitable in others. If so, the estimated impact of membership will be understated.

Pennsylvania—because of the relatively liberal provision that 40 percent of required reserves may be held in obligations of the U. S. Government, the Commonwealth of Pennsylvania or Pennsylvania political sub-divisions—seems to be a good candidate for a state in which Federal Reserve membership is costly. Kentucky also seems to be a likely choice since so few of the banks there (less than 30 percent) are members.

Consequently, small to medium size banks in the Fourth District portions of these states are analyzed separately. Estimates of the membership coefficient (and standard error) are presented for these two groups of banks in Table VII. None of these estimates of the cost of membership are significantly different from zero. Thus, no evidence is found that Federal Reserve membership in Pennsylvania or Kentucky is costly for all

TABLE VII

Estimated Impact of Federal Reserve Membership on Net Income of Selected Fourth District Banks*
1963-1970

	Pennsylvania	Kentucky
1963	−1.076	−.755
	(8.278)	(5.072)
1964	5.337	8.692
	(12.786)	(5.740)
1965	−25.192	−7.416
	(13.153)	(5.250)
1966	7.344	−10.947
	(26.664)	(7.776)
1967	−5.631	10.406
	(16.499)	(9.957)
1968	−1.437	−7.426
	(24.336)	(12.003)
1969	−26.787	15.561
	(19.745)	(11.384)
1970	−6.520	2.794
	(15.351)	(11.181)

NOTE: The estimated impact is in thousands of dollars. None of the estimates are significantly different from zero at the 95% confidence level.

* Banks with $5-$30 million in total assets and located in the Fourth District portions of Pennsylvania and Kentucky.

Source: Federal Reserve Bank of Cleveland

banks, even when banks in these states are treated separately.

One way of evaluating the present study is by considering the implications of the postulate that membership is not costly for banks in the Fourth District and attempting to confirm one or more of those implications. For example, the absence of significant negative coefficients for the membership variable implies that Fourth District member banks had little profit incentive to leave the Federal Reserve System during 1963-1970. Thus, the regression results are consistent with stable Fourth District membership during this period. A sharp drop in Federal Reserve membership would require some explanation other than profit motive, if the regression results are correct.

At first glance, it is startling to discover that the number of member banks in the Fourth District declined by 57, from 527 to 470, between the beginning of 1963 and the end of 1970. This figure is put into perspective, however, by noting that the number of nonmember banks in the Fourth District declined by 32, from 357 to 325 during the same period. Thus, member banks constituted 59.6 percent of all Fourth District banks in 1963 and 59.1 percent in 1970. Bank mergers accounted for virtually all of the reduction in the number of banks, and there was no noticeable tendency for member banks to disappear through merger faster than nonmembers. It is also interesting that, while seven member banks converted to nonmember status during the period under review, six nonmembers converted to membership. Nor was this symmetry of numbers disturbed by asymmetries of size. At the beginning of 1963, member banks held 88.4 percent of total bank assets in the District and 89.2 percent of (i.p.c.) demand deposits. At the end of 1970, these ratios were only slightly lower, 87.1 percent and 87.6 percent, respectively.[15] In summary, there was no substantial net loss of members in the Fourth District between 1962 and 1971.

[15]The minor declines that did occur may be attributed to the composition of new insured commercial banks formed in the District since 1962. Nine national (member) banks and 18 state nonmember new banks have opened. No new state-member bank opened during this period.

SUMMARY

This study cannot claim to have proved that Federal Reserve membership is never costly to any bank. Federal Reserve and state regulations are constantly changing. Consequently, the findings of this study and others like it need not hold for banks in all regions at all times. Additionally, this paper deals with the earnings of member banks as a group compared with the earnings of nonmember banks. It is possible that there are individual banks—both members and nonmembers—whose profitability could be improved by a conversion either into or out of membership. Similarly, there may be some individual banks that would be harmed if they had to change their membership status. All that can be concluded here is that the earnings of Fourth District member banks as a group were not significantly different from those of nonmembers during 1963-70 where allowance is made for differences in location by state, size, growth, loan to investment composition, and the proportion of total deposits made up of time and savings accounts.

Federal Reserve and State Reserve Requirements for Kentucky, Ohio, Pennsylvania, and West Virginia

Percent of Deposits and Composition
1963-1970

(Shaded areas denote changes.)

A. Federal Reserve

	Net Demand Deposits*				Time Deposits			
	Reserve City Banks		Country Banks			Other Time Deposits†		
Effective Date‡	Under $5 Million	Over $5 Million	Under $5 Million	Over $5 Million	Savings	Under $5 Million	Over $5 Million	Composition of Reserves
In effect Jan. 1, 1963	16½%	16½%	12%	12%	4%	4%	4%	Deposits with the Federal Reserve and vault cash.
1966—July 14, 21	16½	16½	12	12	4	4	5	
Sep. 8, 15	16½	16½	12	12	4	4	6	
1967—Mar. 2	16½	16½	12	12	3½	3½	6	
Mar. 16	16½	16½	12	12	3	3	6	
1968—Jan. 11, 18	16½	17	12	12½	3	3	6	
1969—Apr. 17	17	17½	12½	13	3	3	6	
1970—Oct. 1	17	17½	12½	13	3	3	5	

* Demand deposits subject to reserve requirements are gross demand deposits minus cash items in process of collection and demand balances due from domestic banks.

† Effective January 5, 1967, time deposits such as Christmas and vacation club accounts became subject to the same requirements as savings deposits.

‡ When two dates are shown, the first applies to the change at reserve city banks and the second to the change at country banks.

Source: *Federal Reserve Bulletin*

B. Kentucky

	Demand Deposits*			
Effective Date	Reserve City Banks	Country Banks	Time Deposits	Composition of Reserves
In effect Jan. 1, 1963	10%	7%	3%	Demand deposits with commercial banks and vault cash.
June 18, 1970	10	7	3	Up to 25% of the reserve against demand deposits may be in U. S. Treasury or Agency securities with a maturity of one year or less or certificates of deposit issued by banks located in Kentucky. The reserve against time deposits may be invested in securities issued by the U. S. Treasury, the Commonwealth of Kentucky, or certificates of deposit issued by banks located in Kentucky.

*Deposits payable within thirty days.

Source: Office of the Kentucky Commissioner of Banking and Securities

C. Ohio

Effective Date	Demand Deposits*	Time Deposits†	Composition of Reserves
In effect Jan. 1, 1963	15%	10%	Demand deposits with commercial banks and vault cash. Up to 60% of reserves against time deposits may be in obligations issued or guaranteed by the U. S.
Jan. 18, 1968	12	8	
Aug. 18, 1970	12	6	

* Deposits payable within 30 days exclusive of U. S. deposits.
† Exclusive of U. S. postal savings deposits.

Source: Office of the Ohio Superintendent of Banking

D. Pennsylvania

		Time Deposits			
			Other Time Deposits		
Effective Date	Demand Deposits*	Savings	Under $5 Million	Over $5 Million	Composition of Reserves
In effect Jan. 1, 1963	14%	6%	6%	6%	Demand deposits with commercial banks and vault cash. Up to 40% of reserves may be in obligations of the U. S. Treasury, the Commonwealth of Pennsylvania or any Pennsylvania political subdivision.
Jan. 10, 1963	12	4	4	4	
July 21, 1966	12	4	4	5	
March 7, 1967	12	3	3	5	

* Deposits payable within 30 days.

Source: Office of the Pennsylvania Secretary of Banking

E. West Virginia

Effective Date	Demand Deposits*	Time Deposits	Composition of Reserves
In effect Jan. 1, 1963	10%	5%	Demand deposits with commercial banks and vault cash.
July 1, 1969	7	3	

* Deposits payable within 30 days.

Source: Office of the West Virginia Commissioner of Banking

A MEASURE OF MONETARY POLICY

Lorraine E. Duro

The policy actions of monetary authorities have an important influence on economic growth, employment, prices, and the international balance of payments. In addition, they have an effect on the nation's financial markets. For many analysts, the interpretation of policy actions in terms of timing and impact on the economy is difficult from existing financial series.

Essentially, there are three approaches to measuring the direction of monetary policy. One—an eclectic approach—consists of weighing the evidence from a variety of financial variables before reaching a conclusion. This approach is somewhat limited, however, because different variables can provide conflicting signals over the short term. A second approach involves the selection of one variable that is believed to be least affected by nonpolicy forces and therefore least likely to be misleading. Although a number of analysts favor this approach, they do not agree on the variable to be used. A third approach involves the modification of an existing financial variable so that it reflects policy actions.

This study employs the latter approach. The impact of economic activity on the observed money stock is estimated and then removed to derive a measure of policy action. Monetary policy of the past 20 years is then reviewed in terms of this "derived" indicator. The results should be of interest to those who are studying methods of measuring monetary policy and who participate in the debate on the validity of measures of monetary policy.

The Federal Reserve System has among its goals the promotion of economic growth, high employment, price stability, and equilibrium in the nation's balance of payments. The System is also concerned with other goals, such as orderly performance of financial markets. Because of these multiple objectives, it may be difficult to infer policy intent from policy action, at least until the records of the Federal Open Market Committes are made available to the public three months after each meeting. Therefore, many observers try to assess the effect of policy actions—without regard to intent—because of policy's influence on a broad spectrum of economic and financial measures. Frequently, this focuses on the questions of whether, and to what degree, policy is stimulating or restraining economic activity.

The impact of monetary policy can be studied with econometric models of the economy. Such models allow observers to make estimates of impact of a given policy action—as measured by changes in the traditional central bank policy tools—on output, prices, and employment. But for those who do not have access to, or do not prefer to rely on models, an alternative approach is to select an individual or group of financial variables for use as a measure of policy actions.

For many decades, simple indicators—such as the level or change in the quantity of money and certain interest rates—have been used to assess policy action. None of these indicators has been an ideal index of policy actions or impact, because they are biased by their joint dependence on both policy and nonpolicy influences. In addition, the impact of a given policy action is not constant over time. Therefore, the "information" about the effect of policy actions on the behavior of financial measures could be misleading.

Some economists believe that an improved measure of monetary action can be derived by removing the effects of economic activity from the available financial variables. While there is not likely to be a perfect measure of monetary actions, it is nevertheless useful to explore the implications of this alternative by constructing a modified indicator—which is the approach that underlies this study.

The article first discusses the limitations of the indicators in current use. A measure that was derived in an effort to correct for the bias of these indicators is then considered. Finally, monetary policy of the past 20 years, as it would be classified by this new measure, is reviewed.

THE CHOICE OF AN INDICATOR

For a variable to serve as a good indicator of monetary policy, it should be directly affected by actions of monetary authorities and have some predictable relationship to policy goals, but it should not be simultaneously influenced by other economic forces. If such an indicator existed, policy ease or restraint would be signaled by a direction change of the indicator; policy strength would be measured by the magnitude and duration of the changes; and adequacy of policy would be judged by contrasting the posture and strength to an estimate of the economy's needs.

Two broad classes of variables are used to appraise monetary policy actions: one relating to money market variables and another relating to money stock variables. Generally speaking, the first are mainly prices (such as the Federal funds rate and Treasury bill rate) and the second, mainly quantities (such as reserves and money stock). Unfortunately, neither of these classes nor any one

variable from one of these classes solely reflects policy influence. Because both market and money stock related variables show the combined impact of changes in policy and economic activity, they cannot indicate the effect of one independently of the other. To compound the problem, the influence of economic activity on both classes of variables is such that they would lead to opposite conclusions as policy indicators. Accordingly, "money market variables are biased toward a favorable assessment of Federal Reserve policy actions and money-stock related variables are biased toward an unfavorable assessment."[1]

Prices and quantities of many financial variables tend to move in the same direction as economic activity. Interest rates typically rise in periods of economic expansion and fall in recessions. For those who prefer to classify monetary policy based on money market indicators, changes in interest rates would suggest counter-cyclical actions by the monetary authority. However, money stock related variables also tend to rise and fall with cyclical activity. Those who prefer to classify policy according to money stock related variables would therefore conclude that policy was pro-cyclical. Neither judgment of policy is necessarily correct. Cyclical behavior would be observed in both classes of variables even if the economy had no central monetary authority. Therefore, policy should be defined in terms of the alteration of this cyclical pattern by policy actions.

For example, assume banks have some level of excess reserves. Should some technological change in an industry trigger an increase in demand for bank loans and if the banks' demand for excess reserves has some interest elasticity, interest rates would rise and the money stock would increase. These movements, in isolation, could signal opposite policy stance to some observers; i.e., restrictive action on the basis of rising rates or expansive action on the basis of an increased money stock. Ideally, policy should be defined in terms of the response of the monetary authorities to these changes. But the resulting observed levels of interest rates and money will only reflect the combined impact of authority response and the behavior of the public and the banks.

Since economists are well aware of this problem, it is not surprising that many prefer an eclectic approach, subjectively weighing a broad range of indicators to assess the stance of policy actions. However, this approach can lead to diverse estimates of timing and, since it is not quantifiable, provides little indication of magnitude or sufficiency of policy actions in relationship to policy targets or goals.

A new approach was taken by economist Patric Hendershott who chose to construct a "neutralized money stock" to serve as an indicator of monetary policy—rather than to join the debate as to which indicator or set of indicators is least misleading. This approach has its counterpart in fiscal policy in the high-employment surplus or deficit concept. In his construct, deviations from the trend values of components of the money stock were removed. The "neutralized money stock" represented the initial effort to modify a variable and correct the bias problem of conventional monetary policy indicators. However, the acceptance and usefulness of this modified variable has been limited, partially due to the substantial data lag of the variables used in its

[1] Patric H. Hendershott, *The Neutralized Money Stock: An Unbiased Measure of Federal Reserve Policy Actions* (Homewood, Illinois: Richard D. Irwin, Inc., 1968) p. 1.

formulation.[2] Nevertheless, the basic thrust of Hendershott's work that both money market variables and money stock related variables have predictable biases due to cyclical economic activity remains a substantive challenge.

A MODIFIED MEASURE, M_X

In this article, a new modified variable that can be simply calculated on a monthly basis is considered as an indicator of monetary policy. Monetary policy of the past 20 years is discussed in terms of this indicator. Periods of ease and restraint are delineated by increases and decreases of the new series; i.e., by directional movement. Strength and persistance of policy periods are inferred from the percentile rank of the monthly values. Statements of the appropriateness of policy with respect to the stabilization needs of the economy also can be made, but only after some specific target or goal assumption is explicitly stated. It should be stressed at this point that the choice of an indicator, conventional or modified, is separate and distinct from a theory of income determination.[3]

The observed money stock can be thought of as the sum resulting from two major forces: current economic activity and current monetary policy. The former, or endogenous component, reflects changes in overall activity that are transmitted to the money stock by increased bank lending, shifts in currency and deposits, and the use of reserves.[4] The policy, or exogenous component, reflects actions of the monetary authorities. Thus, the observed money stock is the sum of components determined by endogenous and exogenous factors ($M = M_N + M_X$).

Numerous studies indicate that income is related to money with a lag. The distribution and variability of the lag are open questions, but the existence of a lag is not.[5] Therefore, current dollar GNP (Y_t) is a function of the money stock of previous periods (M_{t-n}), and the net effect of other variables (z), including all other current and lagged values of endogenous and exogenous forces other than values of the money stock ($Y_t = f(M_{t-n}, z_t)$).

In contrast, current economic activity has some immediate impact on the money stock. It is not important to this formulation that all of the endogenous force of economic activity be reflected in the current monthly period, but rather that some impact from income to money is present. For example, firms may meet their need for increased working balances in periods of growing economic activity by obtaining bank loans, and consumers may finance durable

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[2] Ronald L. Teigen, "Review of The Neutralized Money Stock, by Patric H. Hendershott." *Journal of Finance,* Vol. 25, No. 4, September 1969, pp. 744-46.

[3] Richard Zecher, "Implications of Four Econometric Models for the Indicators Issue," *American Economic Review,* May 1970, pp. 47-54.

[4] The values of endogenous variables are determined by the simultaneous interaction of the relations in a statistical model; exogenous variables are determined outside the model.

[5] John H. Kareken and Robert M. Solow, "Part 1. Lags in Fiscal and Monetary Policy," *Stabilization Policies, Commission on Money and Credit, Research Studies of the Commission,* (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1963.)

purchases by instalment debt. Therefore, the endogenous component of the money stock is a function of current economic activity ($M_{Nt} = g(Y_t)$).

Thus, the observed money stock is the sum of the exogenous policy portion of the same time period and the endogenous portion that results from current cyclical activity, including that induced by previous policy ($M_t = M_{Xt} + g(Y_t)$). Because of the lagged relationship, it is assumed there is no interaction between the components of the sum in the same time period. This suggests that the current exogenous policy portion can be thought of as the residual of the observed money stock not related to cyclical and secular trends and past policy actions ($M_{Xt} = M_t - M_{Nt} = M_t - g(Y_t)$).

To use this procedure, it was necessary first to select a measure of economic activity that is current (i.e., available with little time lag and subject to minimal revisions), and then to demonstrate that a significant relationship exists between this measure and the money stock. Although the most comprehensive measure of economic activity is Gross National Product (GNP), calculations of a monetary indicator using this series would be limited because of a considerable time lag. A series that is readily available and subject to minimal revisions had to be found to serve as a reasonable GNP proxy. Also, since the formulation specifies independence between current monetary policy and economic activity, the shortest time span compatible with data availability is a prerequisite. The composite index of coincident indicators published by the Department of Commerce has the advantage of being available on a monthly basis and would certainly seem to be a good proxy for GNP.[6] Using this index, the steps taken to infer the policy portion of the money stock (M_X) can be demonstrated.

The objective is to remove the effects of economic activity from the money stock so as to derive a measure of policy actions. As M_N is not an observed value, the money stock is regressed on the composite index and a trend factor as follows:

$$M = a + b_1 CI + b_2 T + u$$

where,

a, b_1, and b_2 are regression estimates and

M = monthly seasonally adjusted money stock in billions of dollars

CI = monthly composite index of coincident indicators

T = dummy variable for time

u = calculated residual term

The term "u" may be viewed as being composed of M_X and v, a random error. In calculating u, the endogenous influence is removed from M_t. However, since M_X is not in the regression, its influence is reflected in "u." (How well M_X is reflected depends at least on two conditions. First, the expected value of v should be close to zero, and its variance should be small. Also, M_X should be independent of the cyclical variable. If these

[6] See BCD series No. 820, published monthly in *Business Conditions Digest,* U. S. Department of Commerce, Washington, D. C. However, it is not clear that this index will adequately reflect price changes since only one of the five series used in its construction reflects current price changes. Consequently, the regressions discussed in the text were duplicated using an index formed by the product of the Industrial Production Index (BCD No. 47) times the Consumer Price Index (BCD No. 781) divided by 100. This economic activity index will be noted as EAI and the regression results using this index will be footnoted.

conditions are not seriously violated, movements in u will reflect movements in M_X.)

As changes in money and economic activity are more meaningfully expressed in percentage terms, rather than levels, the equations are expressed in log form. For example, a $10 billion increase in money stock that totals $100 billion is more expansive in policy terms than a $10 billion increase in a stock that totals $200 billion. Therefore, the log form is used in the regressions, which permits the coefficient for the cyclical indicator to be interpreted as an elasticity value and the time coefficient to be translated into an annual rate of change. For the period 1952-1971, the results are:[7]

(1) $\text{Log } M = 3.03692 + \underset{(15.91)}{.47677}\ \text{Log CI} \underset{(-.44)}{-.00007}\ T \quad R^2 = .96$

Equation 1 suggests that a 5 percent change in the level of economic activity would be associated with a 2.4 percent change in the money stock.[8] Because the period chosen frequently affects regression results, a further test was made to check the stability of the association between economic activity and the money stock.[9] This relationship must be stable if it is to be used to derive a monetary policy measure as the residual. If the impact of *income on money* is highly variable—which is the relationship expected of *money on income*—the exogenous policy portion of the money stock could not be represented by the residual. Therefore, another set of estimates was computed. The monthly data for the period 1952-1971 were disaggregated into periods of economic expansions and economic contractions, based on the reference cycles as defined by the National Bureau of Economic Research (NBER). For the 197 months of economic expansion, the results are:

(2) $\text{Log } M = 2.89152 + \underset{(10.76)}{.51577}\ \text{Log CI} - \underset{(-1.14)}{.00033}\ T \quad R^2 = .95$

and for the 43 contraction months:

(3) $\text{Log } M = 3.0184 + \underset{(23.89)}{.48472}\ \text{Log CI} - \underset{(-.28)}{.00019}\ T \quad R^2 = .98$

The association between the cyclical indicator and money was stable. The time trends are consistently insignificant, but the negative signs do suggest the increasing velocity that prevailed in this time period.[10]

Equation 1 can now be solved for the predicted values of the money stock, or the endogenous component (M_N). The difference between M_N and the observed value of money (M) represents the policy influence on the stock (M_X).

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[7] t-statistics appear in parentheses.

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[8] Using EAI as explained in footnote 6, the results are:

(1a) $\text{Log } M = 2.82093 + \underset{(18.77)}{.54375}\ \text{Log EAI} - \underset{(-4.06)}{.00064} \quad R^2 = .97$

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[9] One technique for a stability test is that proposed by Gregory C. Chow. It consists of estimating long-run coefficients for the independent variables over the full time span under study. These are then tested for equivalence against coefficients estimated for subsets of the data. Gregory C. Chow, "Test of Equality Between Sets of Coefficients in Two Linear Regressions," *Econometrica,* Vol. 28, No. 3, July 1960, pp. 591-605.

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[10] Using EAI, the results for expansions and contractions respectively are:

(2a) $\text{Log } M = 2.7960 + \underset{(17.53)}{.55032}\ \text{Log EAI} - \underset{(-4.18)}{.00070}T \quad R^2 = .97$

(3a) $\text{Log } M = 2.88691 + \underset{(9.88)}{.52693}\ \text{Log EAI} - \underset{(-1.36)}{.00041}T \quad R^2 = .99$

BEHAVIOR OF THE MEASURE

The crucial question is whether the exogenous money stock (M_X) is an accurate indicator of monetary policy—and the original dilemma returns. M_X cannot be measured against the ideal indicator since none exists. However, M_X has the desirable characteristic of exogeneity by construction. It is also assumed in this article that actions of monetary authorities do affect the money stock, and that changes in the money stock influence aggregate output, regardless of the transmission mechanism. Therefore, because of its exogeneity and its link to economic activity, M_X has some of the basic characteristics sought for an indicator.

The informational content indicated by the pattern of M_X values over the past 20 years should also be plausible and reasonable. The indicator is expected to differ from other single indicators since the initial premise of this study is that conventional indicators are "biased." However, M_X ought to reflect policy periods of the past as categorized by eclectic appraisal and hindsight. In general, this policy indicator meets these expectations.

However, it should be noted that when policy is described and periods are designated, definitional problems immediately arise. The descriptive terms used in policy discussions are notoriously imprecise; e.g., "leaning against the wind," "neutral," "easy," "stimulative." Subjective interpretation, personal biases, or different goals can lead to different conclusions and descriptive categories by several observers of a single chart or set of data. Therefore, the scope of the discussion in the next three sections should be carefully interpreted. First, the policy periods and categorizations discussed are those suggested by the derived indicator (M_X). Second, as stated in the introduction, direction and change of direction of the indicator series will be used to define policy posture and select policy periods. When M_X is growing as a proportion of the money stock so that an upward trend is indicated in Chart 1, this pattern of increase will be classified as ease. A downward trend will be treated as a period of restraint. In periods when M_X moves within a narrow range, interrupting but not reversing a basic trend, the interpretation may appear to be ambiguous because only relative terms are appropriate. For example, in 1963 and 1964, M_X remained a relatively constant share of the money stock. Since a downward trend had been evident prior to this time, this period could be considered as ease based on past values, less restrictive if the basic trend is emphasized, or neutral since policy direction was not reversed. In terms of periods selected by directional change, this indicator is in close accord with a number of comprehensive studies that descriptively classify monetary policy periods by weighing all of the variables in retrospect.[11]

Estimates of policy strength and duration can be made by ranking M_X values into percentile classes. However, to make broader judgmental statements about the appropriateness of policy from this indicator, or any other, requires the comparison of the indicator values to some desired goal. For example, if the direction of the indicator is upward but still negative, the policy posture might be categorized as one of ease—but questions remain: How easy? or Is there sufficient ease? The third section that follows shows how an assumed goal may alter policy classifications made only by direction, change, or percentile rank.

[11] One example of an excellent survey is contained in Lester V. Chandler, *The Economics of Money and Banking,* (New York: Harper & Row, Publishers, 1969), Chapters 24 and 25.

Policy Ease or Restraint: Direction of M_X. The pattern of the exogenous money stock (M_X) from 1952 into 1972, stated as a percent of the observed money stock, is illustrated in Chart 1. When the pattern of M_X is compared to the NBER designation of economic expansions and contractions, an estimate of the basic posture of policy as pro- or counter-cyclical can be made. Also, the timeliness of action by the monetary policy-makers can be appraised by contrasting directional change in M_X to the economic peaks and troughs. The major turning points of the policy measure (M_X) and the NBER reference dates are listed in the Table. As measured by the exogenous money stock, the monetary authority responded to the beginning of the 1953, 1957, and 1960 recessions by instituting a movement towards ease in the first or second month following the business peaks. In November 1969, M_X shows the resumption of a policy of ease, after little change in the previous 14 months. (The trend towards ease was instituted in late 1966.) Policy changes in the direction of restraint occurred about two months after the 1954, 1958, and 1961 troughs and 10 months after the 1970 trough. Therefore, generally, policy-makers responded quickly to major periods of change in economic activity. In fact, in the period from 1952 to 1965, monetary policy is basically classified as counter-cyclical by the indicator. This judgment is consistent with conclusions frequently reached by money market observers, even though the indicator is a modified money stock related variable.

In between the major turning points in economic activity, the policy measure also reflects specific periods of action by the monetary authorities. It is evident in Chart 1 that the longer-term trends in the mid-1950's and late 1950's in this policy indicator were downward,

Comparison of Leads and Lags of Policy Indicator (M_X) With Respect to Economic Activity

NBER Reference Dates		Policy Indicator (M_X)	
Peak	Trough	Ease	Restraint
7/53		8/53	
	8/54		9/54
7/57		9/57	
	4/58		6/58
5/60		6/60	
	2/61		4/61
11/69		11/69*	
	11/70		9/71

* Trend towards ease resumed. See text.

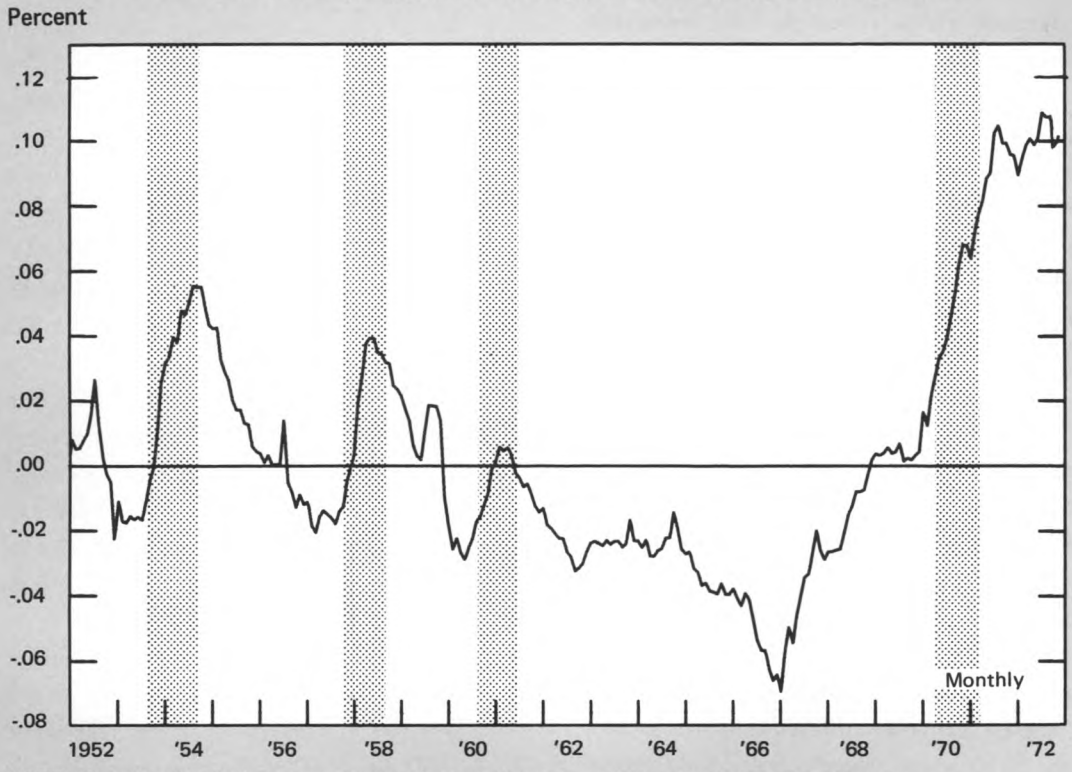
Sources: National Bureau of Economic Research and Federal Reserve Bank of Cleveland

except for brief interruptions in the first half of 1956 and the third quarter of 1959. These two periods are coincident with policy actions taken to counter both the anticipation and actuality of major steel strikes. The policy measure also shows movement within a relatively narrow, negative range from mid-1961 through 1965. This was a period when public policy-makers recognized the need for stimulus to encourage domestic expansion, but their policy posture also took into account the large deficits in the nation's balance of payments. Of this period, one study states: "Even the United States could have its freedom of action limited by considerations related to balance-of-payments and international reserve policy."[12] This limited movement ended with the move toward additional restraint in 1966. A movement toward ease occurred in 1967 and 1968, followed by a interlude of relative neutrality in 1969 and a

[12] *Ibid.*, p. 511.

CHART 1

EXOGENOUS MONEY STOCK (M_X) AS A PERCENT OF OBSERVED MONEY STOCK



NOTE: Shaded areas indicate periods of business contraction as defined by the National Bureau of Economic Research, Inc.

Last entry: December 1972

Source: Federal Reserve Bank of Cleveland

continuation of ease since 1970. Consequently, the exogenous money stock indicator would imply that at least four of the seven years from 1965 through 1972 were pro-cyclical monetary policy years (i.e., 1967, 1968, 1971, and 1972). In summary, the direction of the measure indicates policy periods of ease or restraint, while a contrast of these periods to the economy's cyclical stage leads to the classification of monetary policy as pro- or counter-cyclical.

Policy Strength: Percentile Values of the M_X. Another advantage of a quantifiable measure is that it permits a comparison of policy move. The question can be asked: How do changes in various policy periods differ in magnitude from other policy periods? If the values of the indicator are analyzed

in terms of their distribution, each monthly value of the series can be ranked relative to all other values occurring during the 20-year span. Any monthly value can then be appraised in two dimensions, the percentile rank and the persistence of policy through an appraisal of surrounding values. For example, in 1966, the exogenous money stock reached its lowest value of the 20-year period, and 11 of the monthly values fall in the lowest decile of the two decade distribution. Yet, percentile rank may give an incomplete story if policy posture is not measured against policy goal.

Appropriateness of Policy: Value of M_X vs. Target. While classification in terms of percentile rank is informative, it leaves unanswered the question of appropriateness of policy actions in relationship to the desired goals of resource utilization in the economy. The first differences of the derived policy indicator can be used to appraise the contribution of the exogenous money stock to the observed rates of change in the money stock. This would provide some indication of the adequacy of policy action—if the desired rate of growth of the money stock were specified. However, even the desirability of specifying a growth rate for the money stock is an unresolved issue in economics today and the topic of vigorous debate. Some observations can be made by *assuming* a desired goal. For example, assume that the stock of money should not decline in periods of substantially less than full employment. Given some price rigidities in the economy, it is unlikely that velocity changes could compensate for any consistent decline in the money stock. Therefore, using only this assumption, some of the conclusions drawn by using a percentile rank procedure would have to be modified or even rejected.

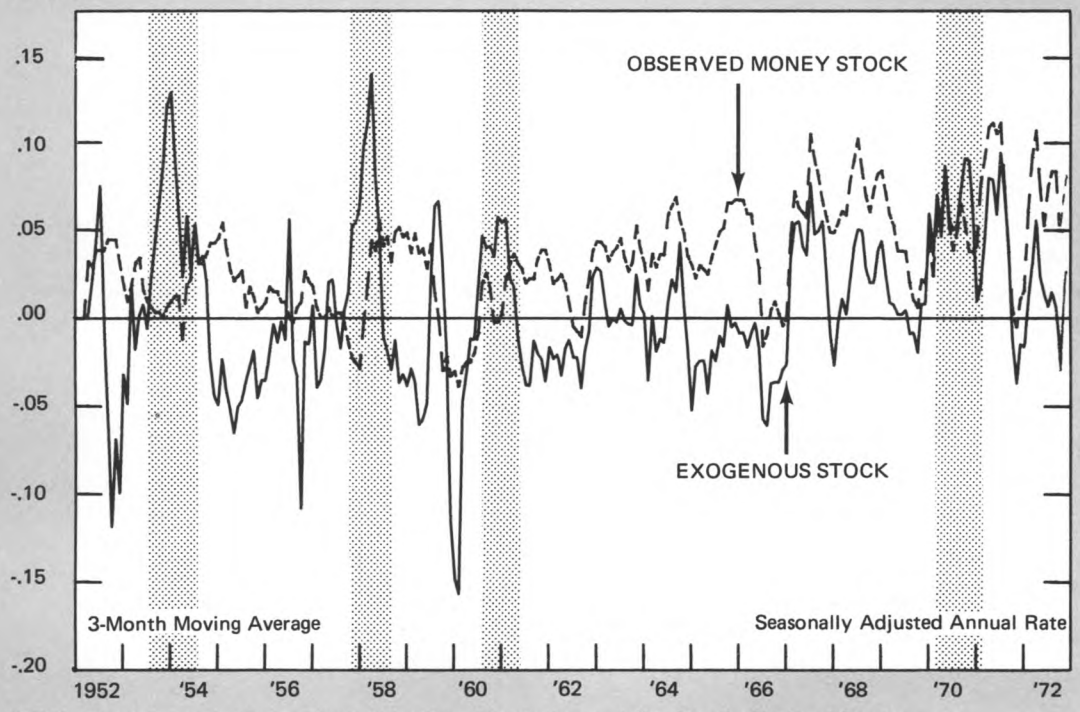
Chart 2 illustrates the money stock series and the exogenous money stock series in terms of annual rate of change adjusted to a three-month moving average. Using values of M_X and percentile rank of Chart 1, monetary policy during the 1954, 1957, and 1960 recessions moved toward ease. However, the growth of the money stock in each of these periods was sharply slowing, as shown in Chart 2, and an actual money decline followed. This demonstrates that, although the annual rate of change in M_X was positive and relatively high (also shown in Chart 2), policy was not as stimulative as it might have been if the goal was to encourage fuller utilization of resources by avoiding a decline in the money stock. In other words, the impact of exogenous policy was not sufficient to offset the decline in the endogenous portion, much less to add consistently to a positive rate of growth.

The same type of analysis could be done for any predetermined desired rate of change in the money stock. If a target rate of growth is specified for a period, based on employment and price level goals of that period, an estimate can be made of the contribution of exogenous policy to that goal. This is not meant to suggest an adoption of the "rule" position for monetary policy. It is instead an explicit recognition of the System's stabilization role with changeable targets to achieve ultimate goals of high employment, price stability, and growth.

CHART 2

OBSERVED MONEY STOCK AND EXOGENOUS MONEY STOCK (M_X)

Percent



NOTE: Shaded areas indicate periods of business contraction as defined by the National Bureau of Economic Research, Inc.

Last entry: December 1972

Sources: Board of Governors of the Federal Reserve System and Federal Reserve Bank of Cleveland

CONCLUSION

One approach in appraising the impact of monetary policy actions on the economy is to select a financial variable that reflects policy. However, all of the financial measures that are readily available are jointly dependent upon policy and nonpolicy influences. Therefore, a debate has developed as to which policy variable is most suitable as an indicator of monetary actions. As one economist stated, "The indicators issue cannot be expected to die so long as the two sets of prime indicator candidates—interest rates and monetary stocks—frequently yield conflicting information about the stance of monetary policy."[13] A choice

[13] Zecher, *op. cit.*, p.47.

of any one interest rate or any one money stock related variable is even more likely to receive a skeptical reception.

This article considers an approach to obtain a modified monthly variable that reflects policy actions only. The derived indicator is subject to measurement error because of its residual technique, but this error is believed to be considerably smaller than that introduced by endogenous economic activity to conventional indicators. (This does not preclude the fact that policy actions will be taken with respect to desired economic activity—in this sense, policy and economic activity are never independent.)

The derived exogenous money stock indicator suggests stabilization policy in the 1950's and the first half of the 1960's was generally counter-cyclical, as shown in Chart 1. When viewed in terms of rate of change, M_X was still basically counter-cyclical in this time span, as contrasted to the rate of change in the money stock (Chart 2). However, it is also evident that policy was not as stimulative as it might have been in some recession periods if a goal assumption of positive growth in the money stock is imposed. In the latter half of the 1960's, M_X shows a mixed pattern of pro- and counter-cyclical action. It is also interesting that, for the 1966-1972 period, the exogenous money stock substantially mirrored the rate of change of the observed money stock. This result is not unexpected during a period of high employment (1966-1969); but since 1970, the pattern implies a departure from previous history. Finally, the indicator derived for this study suggests that there are grounds for examining alternative modified financial variables as a means for interpreting monetary policy actions.

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