THE IMPLICIT DEPOSIT RATE CONCEPT:

ISSUES AND APPLICATIONS

*Michael A. Klein**

I. INTRODUCTION

On June 16, 1933, President Roosevelt signed into law the Banking Act of 1933, Section 11 of which specified that "No bank shall, directly or indirectly, by any device whatsoever, pay an interest on any deposit which is payable on demand." In spite of the 45 years existence of the law, the concept of an "implicit" demand deposit interest rate paid by banks to their depositors is used with increasing frequency by economists in a variety of different contexts.[1]

The determinants of the demand for money have been one of the most intensively researched issues in economics. The well known IS-LM model of the macroeconomics literature suggests a relationship between the effectiveness of monetary and fiscal policy on the one hand and the nature of the demand for money function on the other. Some recent work in this area has attached central importance to the role of the implicit deposit rate in the demand for money function and, in the process, has significantly enhanced understanding of both the nature of this function and its implications for policy-making.

The use of the concept is by no means restricted to money demand theory and its implications for macroeconomic theory and policy. How efficient is the U. S. payments system and to what extent is that efficiency affected by the prohibition? If the prohibition were relaxed or removed entirely, what would be the effect on bank costs and how would this effect be transmitted to the banks' depositors and borrowers? Would removing the prohibition lead to a profound alteration of the competitive position of banks vis-à-vis non-bank depository institutions such as S&L's and mutual savings banks?

It would be presumptuous indeed to assert that economists have arrived at anything like definitive answers to these questions. But it is manifest that the concept of an implicit deposit rate is an important ingredient in securing at least approximate answers. The extent to which the spirit, if not the letter, of the 1933 Banking Act has been circumvented by the payment of an implicit deposit rate affects, in a significant way, economists' responses to the above questions.

The next section of this article examines several approaches to the measurement of the implicit deposit rate. This is followed by a discussion of recent research on the demand for money function—research that makes extensive use of the implicit deposit rate concept. Finally, some implications of the substitution of explicit for implicit interest payments are examined. The development of the NOW account and the Federal Reserve Board's recent proposal to pay interest on member bank reserves are two dramatic examples of this substitution. The article concludes with a discussion of some limitations of the implicit deposit rate concept.

II. MEASURES OF THE IMPLICIT DEMAND DEPOSIT RATE

As administrators of the nation's payments mechanism, commercial banks provide an important flow of services to the general community. The provision of these payments services is costly both to the banking system and to society because real resources are allocated to their production; resources that have an economic opportunity cost measured by the value of the other goods and services which we forego in order to produce payments services. Yet the revenue that a bank receives from these services is rarely equal to the cost to a bank of providing them.

The explanation is well known: demand deposit funds can be used to make loans and purchase other interest-bearing assets the revenues from which are a major source of commercial bank income. Competition for these funds cannot take the form of an explicit interest rate and must, therefore, seek alternative outlets. Perhaps the most obvious alternative is for a bank to reduce its charges to depositors for

* The author, a member of the Department of Economics at Indiana University, was a Visiting Scholar at the Federal Reserve Bank of Richmond during the summer of 1978.

[1] The background of this legislation as well as an appraisal of some of the arguments used to justify the prohibition are discussed in [3, Chapter 2].

Table I

BALANCES, INCOME, EXPENSES, AND IMPLICIT INTEREST COST PER PERSONAL CHECKING ACCOUNT, BY SIZE OF BANK

1975

	Deposits up to $50M	Deposits $50-200M	Deposits over $200M
Average balance per account	$783.00	$967.00	$1,021.00
Income from service and penalty charges (per year)	14.80	11.28	14.56
Expenses (per year)	46.29	49.87	62.59
Implicit interest payment	31.49	38.59	48.03
Implicit interest rate	4.02%	3.99%	4.70%
Implicit interest rate adjusted for reserve requirements	4.43%	4.49%	5.48%

Source: Federal Reserve Board [3, p. 22].

the use of bank payments services below the cost to the bank of providing those services.

A recent study by the Federal Reserve Board staff [3] attempted to quantify this dimension of the implicit demand deposit rate using data from the Federal Reserve's Functional Cost Analysis Program. The program is designed to estimate the costs and revenues associated with various bank functions. Table I summarizes the Board's estimates for participating banks in 1975.

Implicit deposit rates were calculated by deducting annual service charge income per account from expenses per account and dividing the remainder by the average dollar balance per account. These estimates appear in the next to last row. The final row adjusts the interest rate for demand deposit reserve requirements. Since banks must hold non-interest-bearing reserves equal to a minimum percentage of their demand deposits, the cost to a bank for acquiring funds *available for lending* is correspondingly increased.

It is important to understand that these calculations take account of only one easily quantifiable method of circumventing the prohibition: the remission of service charges. In some circumstances such calculations may significantly understate total implicit interest payments. For example, using the above methodology the Board staff study calculated the implicit deposit rate paid to *commercial* demand deposit customers. The estimated rates after adjustment for reserve requirements were 1.60, 1.32, and 1.42 percent for the three size classifications of banks

listed in order of increasing size. The estimated interest rates on commercial accounts were, therefore, only approximately one-third of the rates on personal accounts. Yet it is well known, and recognized by the Board study, that banks use devices other than the remission of service charges to compensate business depositors. A wide variety of cash management services at subsidized rates is made available by banks to business firms. In addition to the provision of transactions services, depositor-borrowers may be given preferential lending treatment in the form of reduced loan interest rates or superior nonprice lending terms. These and other elements of the complex relationship between a bank and its depositors may be more difficult to quantify but are not, for that reason, any less important than the more easily quantifiable remission of service charges.

The results of three different approaches to the estimation of implicit interest rates are presented in Table II. The first two columns provide time series for the estimated demand deposit interest rate whereas the third column presents estimates of the rate of interest on M_1, which includes currency as well as demand deposits, for the 1960-68 period. The reader will undoubtedly be struck by the differences in the magnitudes of these estimates. It is to be remembered, however, that no comprehensive data source exists and very different conceptual approaches were used by the authors of the three studies.

The rates shown in column 1, from William Becker's study [2], were derived by taking *all* noninterest expenses of a bank, subtracting service

Table II

ESTIMATED DEMAND DEPOSIT INTEREST RATES (PERCENT) FROM THREE STUDIES
1960-1968

	Study		
Year	W. Becker [2]	Barro-Santomero [1]	B. Klein [13]
	(1)	(2)	(3)
1960	2.64	1.72	2.38
1961	2.75	1.72	1.74
1962	2.89	1.72	1.94
1963	2.95	1.77	2.12
1964	2.98	1.80	2.40
1965	3.25	1.93	2.68
1966	3.32	2.12	3.46
1967	3.54	2.26	3.11
1968	3.74	2.42	3.70

Note: Estimates reported in column 3 are weighted averages of the interest rate on demand deposits and the assumed zero rate of return on currency.

charges, and dividing the difference by the level of demand deposits. Federal Reserve data on the income and expenses of member banks were used and since all non-interest bank expenses are attributed to the demand deposit function, the series is almost certainly biased upward to a significant extent.

In contrast, the Barro-Santomero study [1] is based on the authors' own survey of 23 commercial banks. The figures presented are simply average remission rates on personal accounts. A remission rate of $0.10 per month per $100, for example, would be stated as an interest rate of 1.2 percent per year. Since remission of service charges based on minimum balances is only one method by which banks subsidize their depositors' use of the payments mechanism, actual implicit rates were undoubtedly higher than those appearing in column 2.

Conceptually, Benjamin Klein's [13] estimates (column 3) are the most interesting. Rather than basing an estimate of the deposit rate on revenue and cost data, he attempts to estimate what rate of interest banks *would have paid* on deposits had the prohibition not been in force. Put differently, he attempts to estimate what the competitive, market determined, demand deposit interest rate would have been. He then assumes that the prohibition was, in fact, completely ineffective and that, in one way or another, the competitive rate was paid to depositors. The nature of his results is described in more detail in the following section of this article.

All three time series have a remarkable tendency to move together: remarkable given the differences in data and conceptual approaches. The simple correlation coefficient between columns 1 and 2 is .97; between columns 2 and 3 it is .93; and between columns 1 and 3 it is .88. We may not know the exact size of the implicit deposit rate, but we have a pretty clear idea of the direction in which it is moving!

III. SOME USES OF THE CONCEPT

The Implicit Deposit Rate and the Demand for Money One of the most interesting recent studies in which the concept of an implicit deposit rate is given central importance is Benjamin Klein's analysis of the determinants of the demand for money [13]. The basic question he poses is this: does the inclusion of a measure of the implicit deposit rate among the determinants of the demand for money significantly improve economists' ability to explain the public's money-holding behavior over long periods of time? Conventional demand for

money functions that exclude the rate of return on demand deposits are used as benchmarks for comparison.

The most common form of the money demand function appearing in these expositions is given by the equation

$$(1) \quad M^d/P = f(r,Y)$$

where M^d is the demand for nominal balances, P is the price level, M^d/P is the demand for real cash balances, r is the rate of interest, and Y is the level of real income. Although there exist substantial variations on the theme, virtually all empirical studies of the determinants of money demand include some scale variable such as measured income, permanent income, or wealth, and some measure of the opportunity cost of holding money such as the rate of interest on other liquid assets. The latter is included to represent the sacrifice involved in holding money rather than some other asset which, unlike money, cannot be used directly to make payments but can be easily converted into money should the need arise *and* carries an explicit rate of return. Of course, it is anticipated that a rise in r will lower money demand—a proposition which is repeatedly confirmed by empirical studies.

Klein contends that the above specification of the cost of holding money is likely to be seriously misleading. Since it identifies the cost of holding money with the (usually short-term) rate of interest, this measure assumes that there is no pecuniary rate of return, explicit or implicit, to the holding of money balances. If, however, the prohibition of interest is either partially or totally evaded, then this measure will overstate the true cost of money holdings.

Klein has a second criticism, somewhat more involved, but helpful to an understanding of his empirical results. Consider the three assets listed below:

Asset	Rate of Return	Opportunity Cost
1. Money	r_m	$i - r_m = P_m$
2. Money Substitute	r_s	$i - r_s = P_s$
3. Long-term Bond	i	0

The first asset is identified as money proper: literally the medium of exchange. It bears an interest rate, denoted by r_m, that can be explicit or implicit and may or may not be equal to zero. The opportunity cost of holding money is found by subtracting r_m from the rate of return on a second asset that yields no monetary exchange services at all. This latter asset is identified in row 3 and may be visualized as a

long-term, non-marketable bond with rate of return i. The difference $i - r_m$ is denoted by the symbol P_m. Klein refers to P_m as the "rental price" of the exchange services provided by a dollar of money holdings.

The third asset (row 2) is defined as a money substitute. It yields exchange services—at the very least, it can be quickly and easily converted into money at a very small cost—and pays an explicit rate of return denoted as r_s. P_s is its opportunity cost and is referred to as the rental price for the exchange services provided by the money substitute.

Just as the demand for any commodity or service is a function of its price, the price of close substitutes and complements, and income, so the demand for money can be written as:

$$(2) \quad M^d/P = f(P_m, P_s, Y).$$

How is the usual specification of money demand given by equation 1 related to the very general form of equation 2? Klein points out that equation 1 implicitly assumes that it is the *difference* between the rental prices of money and money substitutes which determines the demand for money. In this case,

$$(3) \quad M^d/P = f(P_m - P_s, Y).$$

From the definitions given above, the following relationship exists:

$$(4) \quad P_m - P_s = (i - r_m) - (i - r_s) = r_s - r_m.$$

If, as in conventional money demand analysis, the implicit deposit rate is ignored, then $r_m = 0$, $P_m - P_s = r_s$, and equation 3 reduces to the conventional equation 1.

If this seems somewhat abstract, a simple example may be helpful. Imagine it is hypothesized that the demand for butter is a function of the price of butter and the price of a close substitute such as margarine. Equation 1 implicitly asserts that it is the *difference* between the prices of butter and margarine that is relevant whereas equation 2 is more general, stating only that both prices are relevant but not imposing any particular restriction on the nature of the dependence.

Finally, as indicated in the previous section, in conducting his analysis Klein *assumes* that a competitive rate of interest was paid on deposits in spite of the prohibition. Rather than a direct calculation of costs and revenues, the implicit deposit rate is related to the rate of interest that banks could earn

FORMS OF REGRESSIONS AND COEFFICIENT ESTIMATES

A. Form and Time Period of Regressions

(A) $\log M_2 = a_0 + a_1 \log Y + a_2 P_s + a_3 P_m$
(1880-1970)

(B) $\log M_2 = a_0 + a_1 \log Y + a_2 r_s$
(1880-1970)

(C) $\log M_1 = a_0 + a_1 \log Y + a_2 P_s + a_3 P_m$
(1919-1970)

(D) $\log M_1 = a_0 + a_1 \log Y + a_2 r_s$
(1919-1970)

B. Coefficient Estimates

Equation	Y	P_s	P_m	Y	r_s	Standard Error of Estimate
(A)	1.33	.33	−.34			.0773
(B)				1.52	−.06	.1207
(C)	1.56	.42	−.45			.1254
(D)				1.31	−.10	.1493

Note: All reported coefficient estimates are significant at the .99 confidence level.

Source: Adapted from Benjamin Klein [13].

on their marginal investments.[2] After adjustment for reserve requirements and other costs and subsidies implicit in U. S. banking regulations, a deposit rate series is constructed. The rate of return on money is then taken as a weighted average of the rates of return on the components of the money stock.

On this basis, Klein compares regression results for equations that have the general form of equation 2 above with the results for equations having the conventional form of equation 1. A summary of these results is presented in Table III. Equations A and C include the implicit rate of return on the holding of money whereas equations B and D do not. Klein shows that A and C have significantly smaller standard errors of estimate than do their counterparts. In other words, the hypothesis that the prohibition of interest payments on money has been completely ineffective has more "explanatory power" than does the alternative hypothesis that it has been completely effective.

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[2] Designating r_d as the deposit rate, r_I as the marginal return on bank investment, and R/D as the marginal reserve to deposit ratio, then (assuming reserves earn no interest) the competitive deposit rate would be $r_d = r_I(1 - R/D)$.

Also notice how similar are the coefficient estimates, except for sign, of P_s and P_m in equations A and C. If, as is frequently alleged, $P_m - P_s$ is an appropriate measure of the cost of holding money (recall that $P_m - P_s$ is simply $r_s - r_m$), the estimated coefficients of P_m and P_s in equations A and C should be identical except for sign. The actual difference between the coefficients is small enough to be attributed to random error and, therefore, the hypothesis that $r_s - r_m$ is an appropriate measure of the cost of holding money cannot be rejected. The inclusion of a measure of the implicit rate of return on money has enhanced the explanatory power of the regression equations. Therefore, Klein concludes that the hypothesis that the prohibition of interest on demand deposits has been effectively enforced can be rejected.

In addition to providing an imaginative approach to the measurement of the implicit deposit rate, Klein's work is important because it suggests that regulatory policies affecting the payment of interest on demand deposits may have significant *macroeconomic* implications. When market interest rates rise, there will be an associated increase in the implicit return to holding money. This results from the increased competition among banks for deposit funds. Klein's results imply that this rise in the deposit rate will reduce the impact of a given rise in the market interest rate on the demand for money. Thus the observed change in the demand for money is smaller than it would have been if deposit interest prohibition had been effectively enforced.

Imagine that deposit interest prohibition is repealed and that an explicit, competitively determined deposit interest rate replaces the implicit rate. Assume, as seems likely, that the explicit rate can be adjusted more quickly and, perhaps, to a greater degree in response to a change in market interest rates than could the implicit deposit rate. It would then follow that a change in the market interest rate would induce a smaller change in the demand for money than it does under present conditions.

The macroeconomic implications of this depend, of course, on the particular macroeconomic model used. In terms of the well known IS-LM model, this reduction in the sensitivity of the demand for money to the market interest rate would make the LM curve more nearly vertical. This has the effect of reducing the expansionary impact of a rise in government spending financed by either taxes or the issuance of bonds. At the same time, the impact of a change in the money supply would be correspondingly increased.

Disaggregating the Money Demand Function

Benjamin Klein's work relates the rate of return on money to the demand for money. But even the narrowest definition of the money stock commonly used (M_1) consists of currency held by the public as well as demand deposits. Since an implicit return is paid only on demand deposits, the question arises as to how the demands for currency and demand deposits individually respond to a change in the implicit deposit rate.

Although a number of studies of the public's currency holding behavior exist, the only recent study which makes the implicit demand deposit rate central to both the theoretical and empirical analysis is that of William Becker [2], whose estimates of the implicit demand deposit rate were encountered in Section II. Becker relates the demands for currency and demand deposits to the implicit demand deposit rate as well as to the rates of interest on time deposits and open-market assets. To represent the latter, the 4-6 month commercial paper rate was used. He found that although the demand for demand deposits was sensitive to all three interest rates, currency holdings were not significantly influenced by any interest rate variable.

These findings tend to substantiate a previous study by Alan Hess [10]. Hess did not include the rates of return on time and demand deposits in his currency demand function and measured the cost of holding currency exclusively by the 4-6 month commercial paper rate. As did Becker, he found that demand deposit holdings were sensitive to variations in the rate of interest whereas currency holdings were not.

In contrast, theoretical models of household money demand strongly suggest that a rise in the rate of interest on demand deposits should lead to a fall in desired currency holdings. For example, two recent models treat the household's decision problem as one of financing a flow of expenditures over an interval of time in a cost minimizing manner. In one model [1], the household has a choice of three assets to hold: currency, demand deposits, and liquid, interest-bearing assets. In the other model [14], the asset list is extended to include inventories of commodities. In both models, the demand deposit interest rate affects the optimal currency holdings of the household—a rise in the former being associated with a fall in the latter.

If theoretical analysis repeatedly indicates the importance of the demand deposit rate to the demand for currency, why hasn't this relationship been uncovered by the empirical analysis? Utilizing a theoretical model of transactor behavior [14], it can be

Table IV

OUTSTANDING NOW ACCOUNT BALANCES IN MASSACHUSETTS
BY TYPE OF ISSUING INSTITUTION

(thousands of dollars)

Month Ended	Total		Commercial Banks		Mutual Savings Banks		Savings and Loans	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Sept. 1972	11,094	100			11,094	100.0		
Dec. 1972	44,522	100			44,522	100.0		
Dec. 1973	138,028	100			138,028	100.0		
Dec. 1974	286,819	100	56,989	19.9	200,083	69.8	29,747	10.4
Dec. 1975	742,516	100	302,029	40.7	356,319	48.0	84,168	11.3
Dec. 1976	1,439,559	100	807,277	56.1	497,071	34.5	135,211	9.4
Nov. 1977	1,852,491	100	1,051,351	56.8	627,708	33.9	173,432	9.4
Jan. 1978	1,915,409	100	1,097,545	57.3	636,537	33.2	181,327	9.5

Note: Sums may not add to 100 due to rounding errors.

Source: Federal Reserve Bank of Boston Statistical Release.

shown that a rise in the implicit deposit rate (brought about, for example, by a fall in service charges as a result of a new entrant into a banking market) will induce transactors to increase their average holdings of demand deposits at the expense of *both* currency and commodity inventories. Thus, the magnitude of the effect of a change in the deposit interest rate on demand deposit holdings is expected to be substantially larger (and, of course, in the opposite direction) than its impact on currency holdings.

The discussion of Section II revealed that there is no generally accepted method of measuring the implicit deposit rate. It is possible that conceptual difficulties in measurement reinforce the theoretical implication that currency holdings are less sensitive than are desired demand deposit holdings to variations in the implicit deposit rate. This theme is taken up again in the concluding section of the article.

IV. THE SUBSTITUTION OF EXPLICIT FOR IMPLICIT PAYMENTS ON DEPOSITS

Private Financial Innovation The decade of the 1970's has already witnessed profound changes in the nature of the services offered by non-bank thrift institutions. These changes have affected the competitive relationship between banks and thrift institutions and promise to generate an intensive and far-reaching reexamination of the regulatory and structural environment confronting various classes of depository institutions. Thrift institutions will al-

most certainly continue their efforts to attract depositors by offering transactions instruments that bear explicit interest. In this context, the question of whether explicit interest payments should continue to be prohibited on some transactions balances will be under continuous reevaluation.

A financial history of this period will undoubtedly cite the introduction of negotiable orders of withdrawal—NOW accounts—as the primary catalyst for these changes. After a two year court battle, NOW accounts were first offered by the Consumer Savings Bank of Worcester, Massachusetts, on June 12, 1972.[3] The NOW account is simply a method of withdrawing funds from an interest-bearing savings account by means of a negotiable instrument payable to third parties.

By the end of that year, 22 other mutual savings banks in Massachusetts had adopted NOW accounts and the development began to spread to New Hampshire where state laws governing savings banks are similar to those of Massachusetts. Commercial banks were excluded from this development because Federal Reserve and FDIC regulations prohibited the execution of third-party payments from savings accounts. Federal Reserve Board estimates of the proportion of NOW balances attracted from commercial bank demand deposits suggest 80 percent as a reasonable approximation [16]. Clearly, the competitive position of banks in these states was rapidly becoming untenable.

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[3] A good survey of these developments is found in [11].

The result was the passage of Public Law 93-100 on August 16, 1973, which permitted commercial banks in these states to begin offering NOW accounts in January 1974. Table IV recounts the growth of NOW accounts in Massachusetts and its breakdown between depository institutions.

The pricing of NOW accounts is interesting both in its own right and because it is at least indicative of pricing responses to be expected in a variety of alternative contexts. Although the maximum rate of interest payable on NOW accounts is determined by regulation rather than the market, the NOW experiment is a vivid example of the substitution of explicit interest payments for implicit payments on transactions balances.

As of September 30, 1977, 112 commercial banks were offering NOW accounts in Massachusetts. Of these, 108 were paying the maximum legal interest rate of 5 percent although a wide variety of methods of calculating interest and different frequencies of compounding were used. Perhaps more interesting is the diversity of approaches used in pricing transactions services. Only 19 banks offered unlimited free drafts; 5 banks charged $.10 per draft; 7 charged $.15 per draft; and 81 are classified as "other" by the Boston Federal Reserve.[4] This last category includes banks using a combination of free drafts plus a charge for each draft in excess of a specified number. Furthermore, there is evidence [3] that when the NOW experiment was extended to the remaining New England states in March 1976, there was a substantial drop in the percentage of institutions of all types offering unlimited free drafts. Thus, the payment of explicit interest appears to have been accompanied by the pricing of transactions services more nearly in accordance with the private and social cost of providing them.

A clear analysis of the efficiency implications of the substitution of explicit for implicit pricing is found in Harry Johnson [12]. Johnson defines a socially efficient monetary system as one in which competition between banks forces the payment of a competitive, explicit rate of return on the holding of a *stock* of deposits. At the same time, banks charge for their payments services in a competitive fashion; that is, in a manner that reflects the private and social costs of the resources allocated to the production of those services. In this fashion, the public will hold

the socially optimal quantity of money and will also consider the correct opportunity cost of the resources used in providing payments services in their decisions as to how intensively to use the bank payments mechanism.

In contrast, the prohibition of explicit interest payments provides the wrong signals to depositors. The nonpayment of explicit interest induces households and business firms to economize on their holdings of cash balances when there is no social need to do so. At the same time, implicit payments—such as service charges set below the cost to a bank of providing the services of the payments mechanism—encourage excessive utilization of that mechanism. There is, therefore, a resulting increase in the value of society's resources allocated to the provision of payments services.

A second reason for the importance of NOW accounts is that these accounts can be issued—indeed were initiated—by non-bank financial intermediaries. Thus a degree of functional specialization hitherto existing between deposit-type institutions has been significantly eroded. Such specialization has historically been encouraged or required by regulatory policy through limitations on asset acquisition and liability issuance of different institutions. Financial innovation such as the NOW account may suggest that the degree of regulatory-induced specialization is neither socially nor privately optimal. Perhaps more fundamentally, competitive pressures toward financial innovation in conjunction with advances in payments technology may render it impossible to maintain through regulation a non-interest-bearing transactions instrument. As a result, the traditional demand deposit may have to adapt to changed circumstances or face extinction.[5]

Finally, the implications of the substitution of explicit for implicit payments deserve careful study because the potential domain of applicability of this structural change goes well beyond the NOW experiment itself. In late June 1978, the Federal Reserve Board made public a proposal for the payment of interest on reserves combined with explicit pricing of Federal Reserve services. In other words, it proposed a substitution of explicit for implicit pricing in its relationship with its member banks. The following section examines the background to and justification for the proposal.

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[4] The Statistical Section of the Research Department of the Federal Reserve Bank of Boston publishes data pertaining to NOW accounts in New England on a monthly basis. All NOW account data used in this article are from that source.

[5] Evolution is the likely alternative. On May 1, 1978, the Board of Governors approved a plan that will permit individual customers of member banks to transfer funds automatically from their savings to their checking accounts beginning November 1, 1978.

The Federal Reserve's Reform Proposal Member banks of the Federal Reserve System are required to hold non-interest-bearing deposits at the Federal Reserve. As a benefit of membership in the System, banks are provided a variety of "correspondent" services by the Federal Reserve. These services include the clearing and collection of checks, currency shipments, wire transfer of funds, security safekeeping, and others. Although the Federal Reserve provides some services to nonmember banks, these banks usually utilize the correspondent services of other (generally larger) banks.

When one bank provides correspondent services to another bank, the recipient (or respondent) bank "compensates" the providing (or correspondent) bank by holding non-interest-bearing demand balances with it in lieu of direct charges for the services of the correspondent. There is evidence that direct user fees [7] are currently being assessed with greater frequency than in the past for a variety of correspondent services. But the general picture remains: in exchange for a flow of correspondent services, non-interest-bearing deposits are held with the providing bank. Equivalently, correspondent banks pay an implicit return on the correspondent balances they hold, just as banks in general pay an implicit return to their demand depositors.

The Federal Reserve's provision of services to its member banks approximates, at least in form, the correspondent arrangements between private commercial banks. The Federal Reserve provides services to its members similar to those provided by correspondent banks to their customers and member banks hold non-interest-bearing deposits at the Federal Reserve.

If this is so, why is the Federal Reserve proposing a fundamental reform of the system? The Board's proposal could be justified in terms of the efficiency argument presented in the previous section of this article. One important element of Professor Johnson's thesis is that the Federal Reserve should pay interest on reserves and charge for its services. The nonpayment of interest on reserves is viewed as a tax, the burden of which falls primarily on the deposit-holding public.

The Federal Reserve Board's stated justification for the reform is different. The reform is designed "to promote equality among member banks and other financial institutions and to encourage membership in the Federal Reserve System." To understand the problem that implicit pricing poses for the Federal Reserve, a simple example may be helpful.

Imagine there are two comparably sized nonmember banks, Bank A and Bank B, both served by a correspondent bank, Bank C. Assume that their demands for correspondent services differ substantially. In particular, Bank A requires fewer check-clearing services than does Bank B. Bank C, the correspondent bank, will require Bank B to pay for the additional check-clearing services by requiring it to hold a larger deposit balance than it requires from Bank A. In this way, the private market can flexibly adjust the costs of correspondent services to the benefits received by the respondent bank.[6]

In contrast, the balance held by an individual member bank at the Federal Reserve bears no direct relationship to the flow of Federal Reserve services received by the bank. Instead, these balances are determined by reserve requirement ratios. A member bank that uses relatively few Federal Reserve services cannot, for that reason, reduce its reserve balance below that of another comparably sized member bank that utilizes these services intensively. It follows that the implicit rate of return on member bank reserves varies directly with the utilization of Federal Reserve services.

Member banks differ substantially in their utilization of Federal Reserve services. Two recent studies are indicative. In one [8], R. A. Gilbert surveyed 233 member banks in the Eighth Federal Reserve District. Banks were ranked by size of assets and divided into 11 groups of 20 banks each plus a remaining group consisting of the 13 largest banks in the survey. The percentage of banks in the various groups that cleared six or more checks through the St. Louis Federal Reserve Bank during January 1977 ranged from zero in the second group (average asset size of $7.2 million) to 92 percent in the largest bank group (average asset size of $425 million). Using a method similar to Becker's procedure for calculating the implicit return on deposits, Gilbert estimates that the implicit return on reserves is approximately one-half of one percent for small banks and 1.7 percent for the large banks surveyed.

6 This argument is subject to a qualification imposed by the existence of state reserve requirements. If state reserve requirements forced nonmember banks to hold correspondent balances in excess of those which would be required to compensate the providing bank for its provision of correspondent services, the adjustment process described above would be retarded. However, nonmember banks appear to hold cash assets significantly in excess of the amount required to satisfy state reserve requirements [4, Appendix A] although one study [9] did find a relationship between the level of state reserve requirements and the amount of cash assets held by nonmember banks.

NUMERICAL SUMMARY OF COMMERCIAL BANKS BY MEMBERSHIP-SERVICE USE COMBINATION

Fifth District States - January 1978

	Deposit Size Groups							
	$0-25M		$25-50M		$50-100M		All Banks $0-100M	
State	MU	MN	MU	MN	MU	MN	MU	MN
Maryland	2	16	7	5	5	3	14	24
North Carolina	8	6	5	1	1	1	14	8
South Carolina	8	8	4	1	1	0	13	9
Virginia	20	68	16	30	5	6	41	104
West Virginia	9	57	7	20	9	5	25	82
Total	47	155	39	57	21	15	107	227

Note: MU = Member user; MN = Member nonuser.

Source: Bruce J. Summers [17].

A study of the Fifth Federal Reserve District by Bruce Summers [17] classified member banks as users and nonusers of system services. Basically, member nonusers (MN) made no use whatever of Federal Reserve check clearing services whereas banks classified as member users (MU) cleared checks "in volume" through the Federal Reserve Bank of Richmond and used two additional services such as money transfer, security safekeeping, and wire transfer of funds. His results for all member banks up to $100 million in deposits are presented in Table V.

The Federal Reserve could approach this problem in a number of ways. For example, it could make the reserve requirement ratio applicable to a bank depend upon the degree of utilization of its services by that bank. Banks that used those services intensively would be subject to correspondingly higher reserve requirement ratios. Although this would approximate in form the arrangement existing in the private correspondent market, it seems impractical and difficult to implement.

A second possibility is to permit member banks to use some fraction of their correspondent balances to satisfy Federal Reserve reserve requirements. To some extent, this is already being done since the required reserves of a bank are based on its net demand deposits. In calculating its net demand deposits, a bank subtracts its balances at a correspondent from its total demand deposits. This is equivalent to using a fraction of its correspondent balances to satisfy the reserve requirement. But the current "offset" is much smaller than would be re-

quired to equalize the implicit return on reserves among member banks.

Instead, the Federal Reserve has proposed to substitute explicit for implicit pricing. By paying an explicit rate of return on reserves and charging for Federal Reserve services, the link between a member bank's utilization of those services and the return that bank receives on its deposits at the Federal Reserve would be broken. Simultaneously, the cost of the resources used in the provision of those services would be reflected in decisions concerning their utilization. As a result, the allocation of resources would be improved.

V. SUMMARY AND CONCLUSIONS

Although the implicit deposit rate concept can be productively used in a variety of applications, it is subject to certain limitations. It conceals information and, to some extent, provides false information. The statement that an explicit rate of return of 5 percent per annum is paid on deposits has a clear, unambiguous meaning: the deposit of an additional dollar will generate a marginal pecuniary return to its holder of 5 cents per annum—a return which is explicit and not dependent on the characteristics of the individual depositor.

No such information is provided by the assertion that the implicit deposit rate is 5 percent. Indeed, no direct marginal pecuniary or nonpecuniary return may be involved at all. Unless the additional deposit enables the depositor to avail himself of additional bank services at subsidized rates, the marginal return is zero no matter what the average return is calculated to be.

Moreover, any calculated average implicit return can conceal enormous differences between the rates paid to different depositors. Depositors who make relatively heavy use of subsidized services receive a correspondingly higher implicit return unless minimum required deposit levels are continuously adjusted for the level of utilization of bank services.

The fact that the implicit deposit rate is not a direct market signal restricts its usefulness for analytical purposes. For example, a rise in bank costs of providing payments services will inflate the estimates of the implicit deposit rate as constructed by Becker or Gilbert and yet private decision-makers would not alter their behavior unless the rise in costs is translated into a change in a market price such as the service charge rate. Thus, the implicit deposit rate can change with no effect on behavior and conversely. In response to these analytical difficulties, a

recent study of household demand for checking account money by John Boyd [5] made no attempt whatever to define a single interest rate as the rate of return on demand deposits. Instead, household behavior was related directly to the monthly service charge rate and the minimum balance requirements imposed by banks.

In this article, several methods of measuring the implicit deposit rate have been examined. The use of the concept in recent research on the demand for money has been explored. In the process, it was shown that a link exists between the form and effectiveness of price regulation in the financial markets and the behavior of the macroeconomy. Finally, two examples of the substitution of explicit for implicit pricing were discussed: the evolution of the NOW account and the Federal Reserve Board's proposal for the payment of interest on reserves. There is a strong presumption in economic theory in favor of explicit pricing. This presumption applies to the relationship between a commercial bank and its depositors. It applies with equal force to the relationship between the Federal Reserve and its member banks.

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HONEST MONEY

Address by

HENRY C. WALLICH

Member, Board of Governors of the Federal Reserve System

at the M.B.A. Graduation Exercises of the

Fordham Graduate School of Business, New York, New York

June 28, 1978

As you prepare to arise from this seat of learning, the years of intake end and the moment of output is at hand. You may well suspect that you will never know so much as you do now. For a while, you may feel like those great minds who forget more in a year than some learn in a lifetime. Education, after all, is what remains when all the detail has been forgotten. And if you find yourselves close to some leader of business or government, you may be contributing to great achievement. Nothing is impossible to the man with a competent assistant.

At this time, you are presumably looking at your future role in the world in the broadest possible sense, including a moral sense. Today I would like to talk to you about one aspect of your future that has a moral dimension, although it is technically an economic problem. I mean the breakdown in our standards of measuring economic values, as a consequence of inflation. Nothing that is stated about dollars and cents any longer means what it says. Inflation is like a country where nobody speaks the truth. Our failure to deal effectively with inflation results largely from our failure to regard it as a moral issue.

Inflation as Deceit   Inflation introduces an element of deceit into most of our economic dealings. Everybody makes contracts knowing perfectly well that they will not be kept in terms of constant values. Everybody expects the value of the dollar to change over the period of a contract. But any specific allowance made for inflation in such a contract is bound to be a speculation. We do not know whether the most valuable part of the contract may not turn out to be the paper it is written on. This condition is hard to reconcile with simple honesty.

If our contracts were made in terms of unpredictably shifting measures of weight, time, or space, as we buy food, sell our labor, or acquire real estate, we would probably regard that as cheating, and as intolerable. Yet the case is much the same when we are dealing with monetary values.

Nor are we dealing with small differences between promise and performance. At the going rate of inflation of about 8 percent, a year at a leading college that today costs $7,000 will cost $32,630 by the time your children approach college age. If you buy an average home, by the time your present life expectancy ends, your heirs could sell it for almost $2.5 million. Of course, the only sure thing about these calculations is that they will not materialize. Inflation is not stable, nor is it predictable. But I hope the illustrations make their point.

The moral issues posed by inflation go beyond what I consider deceit. Inflation is a means by which the strong can more effectively exploit the weak. The strategically positioned and well organized will gain at the expense of the unorganized and the aged. Because inflation itself is unpredictable, its effects also cannot be predicted and safeguarded against.

Inflation is a means by which debtors exploit creditors. The interest rate may contain an inflation premium, but when you consider that it is taxable to the creditor and tax deductible to the debtor, the scales obviously are ill-balanced. The small saver, moreover, by law is not even allowed to obtain an adequate inflation premium. Interest rate ceilings on savings deposits see to it that he will be a sufferer from inflation. The unpredictability of inflation, again, makes any inflation premium a speculation.

In the eyes of economists and of government, inflation becomes a means of exploiting labor's "money illusion," i.e., its supposed failure to anticipate inflation correctly. The device through which this mechanism operates is the well known "Phillips Curve," i.e., the alleged tradeoff between unemployment and inflation. It is believed that labor will re-

spond to a seemingly large wage offer that subsequently is eroded by inflation. If labor fails to notice the trick, it will keep working for less than it really had demanded, and employment will be higher. A government pretending to serve a nation's interest by, say, misinforming the people about its military plans would be harshly taken to task. Why should trading on the people's money illusion be regarded any differently?

As it happens, the attempt to trade on money illusion has backfired because labor turned out not to be money blind. Mounting inflation was increasingly perceived and as it came to be perceived, to accelerate. In consequence, we got both high inflation and high unemployment. Deceit revealed and rejected nevertheless remains deceit.

Business accounting is made deceptive by inflation. Inventory profits, and profits due to a depreciation schedule that does not take adequate account of replacement costs, grossly exaggerate true earnings. The government permits a remedy for the former —through LIFO—but not for the latter. The effects on profits of a firm's net debtor or creditor position are ignored. Taxes and dividends are paid from profits that may not exist or, if they can be shown to exist by appropriate accounting adjustments, are not backed up by cash flows. In addition to misleading the stockholder and the public, these conditions push firms into higher leveraging. Business thus becomes more speculative.

Meanwhile, planning ahead becomes more difficult for business. Investment lags because long-term commitments involve risks that inflation makes incalculable. The need to guard against these unknowable risks compels both parties to any transaction—buyer and seller, employer and employee, lender and borrower—to introduce a risk premium into pricing. Each must demand a little more or offer a little less than he would under noninflationary conditions. That reduces the range of possible bargains and the level of economic activity. Fewer jobs and less output in the private sector are the results.

Inflation also undermines the honesty of our public policies. It allows the politician to make promises that cannot be met in real terms, because as the government overspends trying to keep those promises, the value of the benefits it delivers shrinks. A permissive attitude toward inflation, by allowing the government to validate its promises by money creation, encourages deceitful promises in politics.

Inflation Threatens the Market System, Property, and Democracy Finally, inflation becomes a means of promoting changes in our economic, social, and political institutions that circumvent the democratic process. Such changes could be forced upon a reluctant nation because inflation may end up making the existing system unviable. One instance is the diminishing ability of households to provide privately for their future. Personal savings, insurance, and pension funds all become inadequate. Money set aside in any of these forms for old age, for sickness, or for education could be wiped out by accelerating inflation. One may indeed ask whether it is not an essential attribute of a civilized society to be able to make that kind of provision for the future. But that is not the point I want to stress. Rather, I want to emphasize that the increasing uncertainty in providing privately for the future pushes people who are seeking security toward the government.

Today, the best hedge against inflation is to be retired from the Federal Government. That guarantees a reliably indexed pension which may outgrow the pay of the job itself. Social security is the next best thing, although at a much lower level. Every other form of pension, even if indexed, is exposed to the risk that the employer, or the private sector as a whole, may not be able to perform. A government pension is riskless, short of a strike at the Bureau of Engraving and Printing.

A similar trend toward bigger government threatens at the level of productive enterprise. Inflation, as I have noted, distorts corporate accounting and cash flows. It creates liquidity and profitability problems. Strong firms become less strong, less strong firms become marginal. Dependence upon and eventually absorption by government may be the ultimate outcome. Countries like Italy and Great Britain are already on their way to this solution.

In the United States we have not yet reached that condition, although the increasing passage of the railroads into government hands is a danger signal. But the role of government nevertheless has expanded as the private sector has retreated before the impact of inflation. Mounting regulation, tax burdens, and other impediments, of course, have also contributed their part.

Not long ago it was taken for granted that at full employment the private sector should be strong enough to produce a surplus in the Federal budget. It was expected, in other words, that the inherent impulses of private consumption and especially in-

vestment would generate a level of aggregate demand sufficient to absorb capacity output. Today this has become very doubtful. Capital formation is too weak and consumption too low to generate enough demand to sustain the economy at full employment without the crutches of a Federal deficit.

We might be able to change this by appropriate tax reform that would stimulate investment. We could adopt policies that would cut down our enormous trade deficit that is sucking purchasing power out of the country. But inflation is an obstacle on either of these courses. Tax reform is unlikely to call forth large-scale business investment so long as inflation beclouds the outlook. Policies to improve the trade balance will avail little if inflation reduces our competitiveness.

Thus, by one route or another, inflation creates a vacuum in the private sector into which the government moves. By making the performance of the economy inadequate, inflation is likely to induce expanded government activity. The same result may follow if inflation leads to the imposition of wage and price controls. Indeed, if enduring controls were imposed, which I do not expect, our market economy would be on the way out. Of the three great dimensions of our society—private rather than public ownership, decision-making by the market rather than by central planning, and democracy rather than authoritarianism—private ownership and market decision-making will then be in retreat. No one can say how long, under such conditions, a shift also in the third dimension, away from democracy and toward authoritarianism, can be avoided.

The Sources of Inflation What can be done? Before we look for remedies, we must examine the causes. Inflation is like cancer—many substances are carcinogenic, and many activities generate inflation. The sources of inflation can be diagnosed at several levels. The familiar debate about the sources of violence provides an analogy. Do guns kill people? Do people kill people? Does society kill people? Some assert that money, and nothing but money, causes inflation—the "guns kill people" proposition. Some assert that the entire gamut of government policies, from deficit spending to protectionism to minimum wage to farm price supports to environmental and safety regulations, causes inflation—the "people kill people" proposition. Some argue, finally, that it is social pressures, competition for the national product, a revolution of aspirations, which are at the root—the "society kills people" proposition. The first view holds the central bank

primarily responsible for inflation, the second the government in general, the third the people that elect and instruct the government.

In addition, time preference, i.e., the social discount rate, enters into the equation. Inflation usually is the final link in a chain of well-meant actions. The benefits of a tax cut, or of increased public spending, are felt within a few weeks or quarters. The penalty in terms of inflation, however, may not come until after a couple of years or even later. Inflation is the long-run consequence of short-run expediencies. Life, to be sure, is a succession of short runs, but every moment is also the long run of some short-run expediency of long ago. We are now experiencing the long-run consequences of the short-run policies of the past. These consequences are as unacceptable as rain on weekends, and just as easy to change. If we continue to meet current problems with new short-run devices, the bill will keep mounting.

We will not defeat inflation if we always take the short view. We will then always find that the cost of fighting inflation is always too high, the short-run loss of output and employment too great. We shall find ourselves ignoring inflation, in the hope that it will somehow not grow worse. That is pure self-deception. Cancer ignored does not become stationary, and neither does inflation. Inflation ignored accelerates.

A Plan for Action A long view is needed on inflation. It is a view very different from that of the politician, who is under enormous pressure to do quickly something that looks good. Harold Wilson said that in politics one week was a long time. More charitably, the pressure is until the next election. If the people will not instruct their elected representatives to do the things that are needed to end inflation, if they turn them out of office because the remedies take time and are temporarily painful, we will keep getting a little more employment and output now at the expense of much more unemployment and loss of output later. And we will get more inflation all along the way, down to its ultimate consequences.

We need to make the ending of inflation our first priority. That must be our overall policy. To implement it in the current circumstances, we need to take a number of steps, some of which I shall list here.

1. We need to recognize that we are currently very close to full employment and accordingly must slow down the growth of the economy, gradually but firmly, to its long-term rate of 3¼-3½ percent.

2. We must limit the pending tax cut to what is needed to offset the effect of inflation on income brackets, perhaps of the order of $10 billion.

3. We must work to bring the budget deficit for 1980 below $40 billion.

4. Monetary policy must prevent increases in money growth that would fuel inflation and must gradually bring the growth of the monetary aggregates down to levels commensurate with the real growth rate of the economy.

5. We must stop adding to inflation by government action such as protectionism, regulation, farm price supports, minimum wage increases, and high government construction costs.

6. We must promote competition through antitrust action, and productivity through tax changes that stimulate investment.

7. We must maintain as strong a dollar internationally as our balance of payments will permit.

8. We would be wise to adopt an incomes policy, commonly referred to as TIP, that employs the tax system and the market mechanism, free from the taint of wage and price controls.

The President's program of voluntary de-escalation of price and wage increases deserves everybody's support. But in our highly competitive environment, voluntary sacrifices on the part of labor and business have their limitations. We should view the program as a supplement to, not a substitute for, a comprehensive anti-inflation program.

If inflation is a moral problem, we require a moral solution; that is, (1) a recognition that public policies have led to serious inequities affecting people in different and unequal ways and (2) a commitment to new policies that will correct the cumulative distortions and contribute to desired economic progress. The policies I have proposed require taking a long-run view of inflation. Nothing will stop inflation overnight, and in the short run the gains will always seem dearly won. But without such a long-run approach, the damage will mount and the ultimate costs will escalate.

You, as you assume your roles in the productive sector of our nation, are in a better position than anyone to take such a long-run view. You have nothing to gain from the expedients of the past. You have a lifetime interest in the honest, non-inflationary, productive performance of the American economy.

MANAGING CASH ASSETS: OPERATING BALANCES AND RESERVE REQUIREMENTS

Bruce J. Summers

Nonearning cash assets make up a significant part of commercial bank balance sheets and have an important influence on bank income. This category of asset yields no monetary return, but must be matched by liabilities on which interest, either implicit or explicit, is paid. However, cash assets do yield implicit returns in the form of services that are necessary to the normal course of commercial banking. Effective commercial bank cash management requires that sufficient nonearning cash assets be held to meet normal business requirements *and* that excess cash balances be minimized. This is a necessary condition if the return on assets is to be maximized.

The factors that determine bank holdings of cash assets can be classified into two broad categories: (1) operational factors and (2) legal factors. The former consist primarily of liquidity needs and bank demands for correspondent services. The latter consist of state and Federal reserve requirements that are administered by the various bank regulatory authorities. While the cash requirements determined by operating needs can reasonably be thought to be constant among banks of like character and location, reserve requirements vary depending on Federal Reserve membership status. In discussions of the cost of Federal Reserve membership, the differing impact of Federal Reserve and state reserve requirements on bank nonearning cash positions is a key issue.

This article examines the influence of operating requirements and reserve requirements on Fifth District member and nonmember banks of less than $100 million in asset size.[1] The first section describes how operational and legal factors combine to determine bank cash asset positions. The second section reviews Fifth District state and Federal Reserve System reserve requirements and critically examines

the popular approach to explaining differences in member and nonmember bank holdings of cash assets. In the third section, the influence of reserve requirements on actual bank cash asset positions is examined. The main conclusions of the article are summarized in the fourth section.

Factors Determining Nonearning Cash Asset Positions Banks hold a variety of cash assets, which fall into six categories for official reporting purposes. Schedule C of the Consolidated Report of Condition lists these six categories as:

1. Cash items in the process of collection;

2. Demand balances with banks in the United States;

3. Other balances with banks in the United States, including interest-bearing balances;

4. Balances with banks in foreign countries, including interest-bearing balances;

5. Currency and coin;

6. Deposits with the Federal Reserve.

Time balances held with U. S. banks may earn interest, and therefore do not strictly belong with nonearning cash assets. Except for large banks, balances with foreign banks do not generally play an important role in determining total cash positions, and can be ignored in analyses focusing on smaller sized banks. This leaves cash items in the process of collection (CIPC), demand balances due from domestic banks, currency and coin or vault cash, and deposits with the Federal Reserve as the major components of smaller bank nonearning cash portfolios.

Opportunity Cost and Implicit Return The cost associated with holding these nonearning cash assets is an opportunity cost equal to the income foregone by not investing the funds. This opportunity cost is equal to the cost of supporting matching liabilities, including interest payments and operating expenses, plus a profit margin.

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[1] These banks account for over 90 percent of all Fifth District banks and approximately 30 percent of total commercial bank deposits. On a national basis, banks less than $100 million in asset size account for about three-quarters of all banks and over 20 percent of total commercial bank deposits.

The return associated with holding these assets is an implicit return, i.e., the rate of return is not expressed as a monetary interest rate. Rather, the return takes the form of service yields to the bank. Nonearning cash assets provide essentially three types of services: (1) they provide banks with liquidity; (2) they gain banks access to certain correspondent services; and (3) they meet banks' needs for legal reserve assets.

Binding Versus Nonbinding Reserve Requirements A commonly held view is that the proportion of cash assets to total assets held by banks is determined primarily by reserve requirements. If reserve requirements force banks to maintain a proportion of cash assets greater than that which would be maintained purely for operating purposes, then reserve requirements are defined as binding. It is also possible, however, that the proportion of cash assets held by banks for purely operating purposes may exceed the minimum proportion held in response to the legal requirement. In this case, reserve requirements are defined as nonbinding.

Whether or not reserve requirements are binding or nonbinding is important for at least two reasons. First, reserve requirements are always included among the tools of monetary policy. If these requirements are lowered (raised), economic theory states that a multiple expansion (contraction) of bank credit and deposits is to be expected. Clearly, however, this theory holds only if reserve requirements are binding. For example, given a reduction in reserve requirements, banks would reduce cash assets and thereby increase bank credit only if the amount of such assets held to meet the legal reserve requirement was greater than the amount held to fulfill operating needs. Second, the effects of reserve requirements on member and nonmember banks have implications for the question of the comparative costs of membership versus nonmembership in the Federal Reserve System. The cost of membership is equal to the income foregone on cash assets maintained for the purpose of meeting System reserve requirements that are in excess of operating needs. By contrast, the cost of nonmembership is equal to the income foregone on cash assets maintained for the purpose of meeting state reserve requirements that are in excess of operating needs. If state and Federal reserve requirements are binding, changes in these requirements would lead to changes in bank cash positions that might alter the relation between the opportunity costs associated with membership versus nonmembership. If both are nonbinding, reserve requirements would not be relevant to the question

of the comparative costs of System membership and the nonmembership alternative.

Explaining Cash Assets of Nonmember and Member Banks Each of the four main types of cash assets described above provides some combination of liquidity, correspondent service, and legal reserve service to commercial banks. A hypothetical example will help illustrate how cash items in process, due from balances, vault cash, and deposits with the Federal Reserve combine to meet these various needs for nonmember and member banks.

Assume there are two commercial banks identical with respect to size, location, and deposit composition, but not Federal Reserve membership status. With all their characteristics identical except membership status, these ideally paired comparison banks can also be assumed to have identical demands for correspondent banking services. For simplicity, also assume that these banks do not act as correspondent banks, i.e., they do not provide correspondent banking services to respondent banks. This assumption is realistic for smaller banks only, and even then may not be true in every instance.

The nonmember bank holds three of the four types of cash assets described above, and its holdings of each asset can be expressed as a percentage of total deposits. Let c_n be the total nonearning cash asset to total deposit ratio of the nonmember bank, where the subscript n denotes nonmember. Then

$$c_n = p_n + b_n + v_n,$$

where p, b, and v represent proportions to total deposits of cash items in process of collection, due from balances, and vault cash, respectively. Using the same notation but with the subscript m to denote the member bank, we have

$$c_m = p_m + b_m + v_m + f_m,$$

where f represents the proportion to total deposits of balances held with the Federal Reserve. How then, do operational and legal factors combine to govern the proportions of cash assets to total deposits held by nonmember and member banks? The contribution made to bank operations by each type of cash asset will be described below, followed by an explanation of the interaction between operational and legal factors for the comparison nonmember and member banks.

For both the nonmember bank and the member bank, cash items in process of collection represent uncollected funds arising primarily in connection with check clearing activity. The proportion of CIPC held is determined by the dollar volume of checks

being presented for clearing and by the clearing bank's (i.e., a Reserve bank or private correspondent bank) collection schedule. The clearing bank's collection schedule and accounting procedures also influence due from balances, for once collected, funds are credited to the respondent's correspondent account.[2] For simplicity, assume that dollar volume of clearings is the dominant factor underlying the proportion of CIPC held. Given their identical characteristics, it can reasonably be assumed that the average volume of clearings is identical for the two comparison banks. Their proportions of CIPC to total deposits, therefore, are also identical.

Each of the comparison banks must hold liquid assets for the purpose of meeting anticipated and unforeseen deposit withdrawals. Deposit withdrawals may be made in the form of check or cash. For the nonmember bank, due from balances and vault cash both provide such liquidity services. The member bank liquidity requirement, which is assumed equal to that of the comparison nonmember bank, is met using due from balances, vault cash, and deposits held with Reserve banks. Vault cash, moreover, must be held in some minimum amount that allows the banks to meet that part of the liquidity requirement associated with currency demands. The other types of cash assets available to meet liquidity requirements will supplement the minimum proportion of vault cash that is determined by currency needs.

A primary means of payment for correspondent banking services involves holding balances with correspondents [4], and therefore due from balances carry an additional service yield in the form of correspondent services. The nonmember bank receives all of its correspondent banking services from private correspondent banks, while the member bank can satisfy at least part of its correspondent service requirement using System services. Recalling that the total correspondent service requirement is assumed equal for the two comparison banks, it follows that the member bank's holdings of due from balances will be less than those of the nonmember bank. This is the case inasmuch as balances held with correspond-

ents vary depending on the amount of private correspondent services consumed. The greater the share of the member bank's total correspondent service needs that is satisfied through the Federal Reserve System, the smaller its holdings of correspondent balances relative to those of the nonmember bank.

Both due from balances and vault cash are eligible reserve assets for the nonmember bank. Some states, moreover, count CIPC as eligible reserve assets.[3] If the legally required minimum combination of due from balances, vault cash, and, where appropriate, CIPC exceeds the minimum needed for purposes of liquidity and gaining access to correspondent services, then the state reserve requirement is binding. If the proportion of cash assets required for legal purposes is less than or equal to the desired operating minimum, then the state reserve requirement is nonbinding.

In practice, it may be difficult to clearly identify cases of binding state reserve requirements. If required cash assets exceed desired cash assets, what is actually observed is that amount of cash assets held to meet the requirement; this is a necessary legal condition for the bank to continue operating. In this case it is impossible to tell whether the reserve requirement is nonbinding (required cash just equaling desired cash) or whether the requirement is binding (desired cash being less than required cash). However, if actual observed cash assets exceed the calculated minimum of required cash assets by a substantial margin, the unambiguous conclusion is reached that reserve requirements are nonbinding. In this case observed cash equals desired cash, and this quantity exceeds the legal minimum. To conclude otherwise would imply that banks are insensitive to carrying excess cash balances, or put another way, that banks are not profit maximizers.

Explaining the interaction of legal and operational factors is more difficult in the case of the member bank than the nonmember bank. For the member bank, only vault cash and balances held with Reserve banks are eligible reserve assets. The amount of such balances held must at least equal the legal minimum reserve requirement. Member bank reserve assets may also yield an implicit return in the form of correspondent services, however. By virtue of membership in the Federal Reserve, the member bank gains access to System services. The required

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[2] Correspondent bank accounting procedures make it difficult to clearly distinguish between CIPC and due from balances for banks clearing through correspondents. Some correspondent banks grant immediate book credit for cash items presented for clearing, a practice that acts to understate respondent bank CIPC and to overstate due from balances. Federal Reserve banks grant book credit for cash items according to a predetermined collection schedule based on actual clearing experience. Consequently, CIPC may be lower, and due from balances higher, for banks clearing through correspondents than for banks clearing through Reserve banks. For simplicity, due from balances as used in this section of the article represent collected funds.

[3] A number of states, including Maryland and Virginia in the Fifth District, also count earning assets toward fulfillment of the required reserve [2]. In this analysis, that portion of the legal reserve requirement that can be met using earning assets is not considered a cash management constraint, and is therefore ignored.

reserve is in this sense comparable to a compensating balance held with a correspondent bank. Unlike compensating balances held with private correspondent banks, however, the compensating balance held with the Reserve bank does not vary depending on the quantity of services consumed. Rather, the compensation paid for access to System services is fixed by the legal reserve requirement.

Some important correspondent services (e.g., loan participations and investment guidance) are not available through the Federal Reserve. Moreover, it is known that many small member banks make little use of System services [1, 7]. For these reasons, most member banks also obtain services from private correspondents and hold due from balances in payment. Member bank due from balances might be termed supplementary correspondent balances, since they are held primarily as payment for services not received through the Federal Reserve. These supplementary balances could equal zero, or be close to zero, if System services fulfilled the greatest portion of the member bank's needs.

Computation of the legal reserve does not of itself fully explain the total cash asset requirement resulting from the comparison bank's status as a member of the Federal Reserve System. A more complete explanation of the effect of System reserve requirements must take into account not only the required reserve ratio, but also the type of assets eligible to meet the requirement and the degree to which member bank correspondent service needs are met by the Federal Reserve. These various effects are captured in a measure that includes the legal minimum combination of reserve assets *and* supplementary due from balances. Including member bank holdings of correspondent balances in the calculation of the cash asset requirement accounts for (1) the fact that due from balances are not eligible reserve assets and (2) the possibility that System services do not completely satisfy bank correspondent service demands. The System reserve requirement is binding if a lowering of the legal reserve ratio causes the member bank to reduce its holdings of Reserve bank balances. This occurs only if the amount of cash assets desired for liquidity purposes is less than the total of legally required cash assets plus supplementary due from balances. The System requirement is nonbinding if a lowering of the legal reserve ratio does not cause the member bank to reduce its holdings of Reserve bank balances. In this case, the liquidity requirement at least equals the total of legally required cash assets plus supplementary due from balances.

Previous empirical studies provide information about how the operational factors and legal factors described above actually affect nonmember and member banks. First of all, the evidence suggests that state reserve requirements are nonbinding [3, 6].[4] Moreover, it has been shown that, on average, member banks hold greater proportions of cash assets than do nonmember banks [5, 9]. Taken together, these results lead to the conclusion that the proportion of cash assets held by member banks taken as a group is more than necessary to satisfy normal operating requirements. This further suggests that Federal Reserve System reserve requirements, unlike those of the various states, are binding.

The remainder of the article will examine how these operational and legal factors affect Fifth District member and nonmember banks of various sizes and within different states. Tests will be conducted to determine if state and Federal reserve requirements are binding or nonbinding. Also, differences in actual cash asset to total deposit ratios of member and nonmember banks will be computed.

Fifth District Reserve Requirements and Required Nonearning Cash Assets The legal and administrative reserve requirements and reserve accounting procedures for the five Fifth District states and the Federal Reserve System are catalogued in Table I. This summary, which covers deposits subject to reserve requirements, reserve requirement ratios, and eligible reserve assets, indicates there is a great deal of variety within the District regarding statutory bank reserve provisions. Two states, Maryland and North Carolina, provide for an adjustment to deposits subject to reserve requirements, as does the Federal Reserve. One state, North Carolina, has graduated reserve ratios tied to the amount of demand deposits held and to the maturity of time deposits, as does the Federal Reserve. Also, interest-bearing securities are eligible as part of the required reserve in Maryland and Virginia.

Bankers and bank regulators commonly focus on statutory reserve requirements, and especially on required reserve ratios, as guidelines to measuring differences in member and nonmember bank cash positions. Such comparisons sometimes consider effective reserve requirement ratios, i.e., statutory reserve ratios adjusted to exclude that portion of the

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[4] While Goldberg and Rose [3] conclude that the effect of state reserve requirements on nonmember bank cash positions is positive and statistically significant, they also show that it is insubstantial.

Table I

SUMMARY OF LEGAL RESERVE REQUIREMENTS AND RESERVE ACCOUNTING PROCEDURES

Fifth District States and Federal Reserve System

August 1978

Authority	Deposits Subject to Reserve Requirements		Reserve Requirement Ratio		Eligible Reserve Assets				Reserve Accounting Procedures
	Demand	Time	Demand	Time	Demand		Time		
Maryland	Total demand deposits less collateralized deposits of public funds.	Total time deposits less collateralized deposits of public funds.	15%	3%	Vault cash Due from banks	at least 66⅔% of total reserve	Vault cash Due from banks U. S. Govt. securities State of Md. securities		Contemporaneous reserve accounting on a daily basis. No formal penalties for reserve deficiencies.
					U. S. Govt. securities State of Md. securities Approved obligations of Md. municipalities	up to 33½% of total reserve			
North Carolina	Total demand deposits less collateralized deposits of public funds.	Total time deposits less collateralized deposits of public funds.	$ millions 0-2 ....8% 2-10 ....10% 10-100....12% 100-400....13% over 400....15%	Savings and time open account....3% Other time maturing in 180 days or more ....3% maturing in less than 180 days 0-5 million ....3% over 5 million 6%	Vault cash Due from banks CIPC		Vault cash Due from banks CIPC		Contemporaneous reserve accounting using a daily average based on a 14 day period. No formal penalties for reserve deficiencies.
South Carolina	Total demand deposits.	Total time deposits.	7%	3%	Vault cash Due from banks CIPC with a standing of 10 days or less		Vault cash Due from banks CIPC with a standing of 10 days or less		Contemporaneous reserve accounting on a daily basis. No formal penalties for reserve deficiencies.
Virginia	Total demand deposits net of reciprocal balances.	Total time deposits net of reciprocal balances.	10%	3%	Vault cash Due from banks CIPC		Vault cash Due from banks CIPC	at least 75% of total reserve	Reserves computed from opening deposit figures (one-day lag) using a daily average based on a 14 day period. No formal penalty for reserve deficiencies.
							Short term U. S. Govt. securities	up to 25% of total reserve	
West Virginia	Total demand deposits.	Total time deposits.	7%	3%	Vault cash	at least 20% of total reserve	Vault cash	at least 20% of total reserve	Reserves computed from opening deposit figures (one-day lag) using a daily average based on a 14 day period. Penalty for reserve deficiencies assessed at a rate of 2% per annum above the lowest rate applicable to borrowings by member banks from the Federal Reserve.
					Due from banks CIPC		Due from banks CIPC		
Federal Reserve System[1]	Total demand deposits less CIPC and demand balances due from commercial banks.	Total time deposits.	$ millions 0-2 ....7% 2-10 ....9½% 10-100....11¾% 100-400....12¾% over 400....16¼%	Savings[2] ....3% Time 0-5 million[2] maturing in 30-179 days ....3% 180 days- 4 yrs ....2½% 4 yrs or more ..1% Time over 5 million[2] maturing in 30-179 days ....6% 180 days- 4 yrs ....2½% 4 yrs or more ..1%	Vault cash Deposits with F.R. Banks		Vault cash Deposits with F.R. Banks		Two-week lag using a daily average based on a 7 day period. Penalty for reserve deficiencies assessed at a rate of 2% per annum above the lowest rate applicable to borrowings by member banks from the Federal Reserve.

[1] There are legal minimum and maximum limits on reserve requirements.

	Minimum	Maximum
Net demand:		
Reserve city banks	10	22
Other banks	7	14
Time	3	10

[2] The average of reserves on savings and other time deposits must be at least 3 percent, the minimum specified by law.

Source: Federal Reserve Bulletin, relevant statutes of the various states, and state banking departments.

required reserve that can be held in the form of earning assets. Their widespread use notwithstanding, comparisons of this general type are faulty on at least two counts.

First, effective reserve requirements often give an unclear picture of actual reserves required. For example, as commonly used, effective reserve requirements ignore adjustment of the total deposit base for such things as CIPC, due from balances, and government deposits. As Table I shows, these adjustments are important for Maryland, North Carolina, and the Federal Reserve. Moreover, it is difficult to make any generalization about the impact of effective reserve requirements on banks of varying sizes within states, since the mix of demand and time deposits often varies by bank size. Deposit mix may also vary considerably among states, thus complicating attempts to classify states according to reserve stringency. In Table I, South Carolina and West Virginia are shown to have the same effective reserve requirement. Inasmuch as South Carolina banks hold much larger proportions of demand deposits than do West Virginia banks, however, it might be expected that actual required reserves would be considerably larger in South Carolina [8]. This is shown to be the case in Table II.

The second, more serious, drawback to relying on effective reserve requirements as guidelines to actual bank cash positions is the possibility that reserve requirements are nonbinding. As mentioned in the first section of this article, there is evidence to suggest that this is the case for many nonmember banks. As a step toward testing the hypothesis that reserve

requirements applying to Fifth District banks are nonbinding, the statutory guidelines listed in Table I are used to compute the required nonearning asset reserve expressed as a percentage of total deposits for four size groupings of member and nonmember banks. The four groups, based on total asset size, are under $10 million, $10-25 million, $25-50 million, and $50-100 million, respectively. These size groupings contain 334 member and 346 nonmember insured commercial banks as of June 30, 1977. The procedure followed is essentially that used by an individual commercial bank in computing its required reserve, except that in this instance banks of like size have been grouped together. All required nonearning asset ratios are computed using June 30, 1977 Call Report data.[5]

In Maryland and Virginia, where securities are eligible reserve assets, the legal reserve ratio is adjusted downward using the formula

$$ER = (1-P)R,$$

where: ER = effective reserve ratio;

P = proportion of reserve that can be held in earning assets; and,

R = statutory reserve requirement.

This adjustment is made to exclude the influence of provisions that allow earning assets to be held as part of the legal reserve.

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[5] Tests reviewed in another study [7] suggest that midyear Call Report data on Fifth District bank cash asset positions can be validly used as proxies for bank behavior averaged over longer time periods.

Table II

REQUIRED NONEARNING CASH ASSETS AS A PERCENT OF TOTAL DEPOSITS

Member and Nonmember Banks by Size Group

Fifth District States

Calculated from 6-30-77 Call Report

| | Asset Size Groups, Millions of Dollars | | | | | | | |
| | Under 10 | | 10-25 | | 25-50 | | 50-100 | |
State	Member	Nonmember	Member	Nonmember	Member	Nonmember	Member	Nonmember
Maryland	.0413	.0262	.0426	.0295	.0454	.0337	.0560	.0376
North Carolina	.0401	.0428	.0446	.0395	.0465	.0487	.0572	.0484
South Carolina	.0495	.0475	.0511	.0472	.0552	.0495	.0535[1]	.0468
Virginia	.0387	.0470	.0417	.0454	.0428	.0439	.0486	.0496
West Virginia	.0395	.0429	.0432	.0423	.0439	.0419	.0477	.0419

[1] Fewer than three banks in group.

In Maryland and North Carolina, the deposit base subject to reserve requirements is net of collateralized deposits of public funds. It is assumed that all government deposits are collateralized, and such deposits are therefore deducted from total deposits to arrive at a net deposit base.

Federal Reserve and North Carolina required reserve ratios on time deposits are graduated by amount held and maturity classification. Inasmuch as the Call Report does not provide deposit breakdown by maturity class, assumptions must be made as to time deposit maturity structure. The July 27, 1977 Fifth District Survey of Time and Savings Deposits is used to derive ratios showing the proportion of total time deposits held in amounts less than $100 thousand in specific maturity classifications to total time deposits in amounts less than $100 thousand. These ratios are used to calculate member bank and North Carolina nonmember bank required reserves against time deposits of less than $100 thousand. The June 30, 1977 Fifth District survey of maturity distribution on weekly reporting bank negotiable CD's is used to derive ratios showing proportions of time deposits held in amounts greater than $100 thousand in specific maturity classifications to total time deposits in amounts greater than $100 thousand. These ratios are used to calculate member bank and North Carolina nonmember bank reserves against time deposits in amounts greater than $100 thousand.

The June 30, 1977 required nonearning asset reserves expressed as percentages of total deposits are presented in Table II. Comparisons show that member banks' required nonearning asset reserve ratios are lower than nonmember banks' ratios in seven out of a possible twenty groups. These groups are: North Carolina, under $10 million and $25-50 million; Virginia, under $10 million, $10-25 million, $25-50 million, and $50-100 million; and West Virginia, under $10 million. An unweighted average of the differences in member-nonmember bank ratios by size group and across states shows that member bank required nonearning asset reserve ratios are higher by .05 percent, .39 percent, .32 percent, and .77 percent, in ascending order of asset size. Perhaps the most striking feature of Table II is the narrow average differential that exists between member and nonmember bank required nonearning cash asset ratios, especially for the smaller size groups. It is also important to consider, however, the relationship that exists between these required ratios and actual bank cash asset ratios.

A Review of Actual Cash Asset Positions Actual cash asset to total deposit ratios are shown in Table III for the same forty groups of banks appearing in Table II. The types of nonearning cash assets that make up Table III include demand balances due from U. S. banks, currency and coin, and deposits with the Federal Reserve. These are the

Table III

ACTUAL CASH ASSETS AS A PERCENT OF TOTAL DEPOSITS[1]

Member and Nonmember Banks by Size Group

Fifth District States

Calculated from 6-30-77 Call Report

	Asset Size Groups, Millions of Dollars							
State	Under 10		10-25		25-50		50-100	
	Member	Nonmember	Member	Nonmember	Member	Nonmember	Member	Nonmember
Maryland	.0946	.0639	.0870	.0669	.0828	.0824	.0964	.0895
North Carolina	.0886	.1053	.0867	.0881	.0780	.0798	.1141	.0615
South Carolina	.1281	.1095	.1021	.0885	.1086	.0817	.1074[2]	.0876
Virginia	.0821	.0843	.0812	.0683	.0747	.0597	.0772	.0842
West Virginia	.1082	.0862	.0852	.0669	.0867	.0667	.0872	.0443

[1] Includes demand balances due from U. S. banks, currency and coin, and deposits with the Federal Reserve; excluded are CIPC, other balances due from U. S. banks (e.g., interest bearing balances) and balances due from foreign banks. Together, these six items make up asset item 1 on the Report of Condition, "cash and due from banks."

[2] Fewer than three banks in group.

same categories of cash assets whose properties are considered in the first section of this article.[6]

Comparing nonmember bank required nonearning cash asset ratios in Table II with actual cash asset ratios in Table III supports the conclusion that state reserve requirements in the Fifth Federal Reserve District are nonbinding. In every case but one (West Virginia $50-100 million), nonmember actual cash asset ratios exceed required cash asset ratios by a substantial margin. Evidently, the proportion of cash required by Fifth District nonmember banks for operating purposes exceeds the proportion required for meeting the legal reserve. Strictly speaking, a similar comparison for member banks is not relevant, inasmuch as the legally required nonearning cash ratios do not account for supplementary due from correspondent balances.

The question of whether or not Fifth District state and Federal Reserve System reserve requirements are binding can also be addressed using regression analysis. Using this method of analysis leads to the conclusion that the state reserve requirements are nonbinding while System reserve requirements are binding. Interested readers are referred to the Appendix for the detailed results.

It is relevant to compare member and nonmember bank actual nonearning cash asset ratios. Having shown that the nonmember ratios represent cash balances desired for operating purposes, comparison of these ratios with member bank ratios will indicate if the member bank size groups hold greater proportions of cash assets than are necessary according to the nonmembers' operating criteria. This appears to be generally the case. Member banks' actual nonearning cash asset ratios in Table III are lower than nonmember banks' ratios in only five of the groups (down from seven in Table II).[7] These groups are: North Carolina, under $10 million, $10-25 million, and $25-50 million; and Virginia, under $10 million

and $50-100 million. Moreover, in only one of these five cases is the member bank group's ratio substantially lower (more than 1 percentage point lower) than the comparison nonmember bank ratio.

An unweighted average of the differences in member-nonmember bank ratios by size group and across states shows that member bank cash asset ratios are higher by 1.05 percent, 1.27 percent, 1.25 percent, and 2.30 percent, in ascending order of asset size.[8] These average differences are considerably greater than those prevailing between member and nonmember required nonearning asset reserve ratios. They suggest that, on average, Fifth District nonmember banks less than $100 million in asset size have available for investment from a little over 1 percent to 2.3 percent more of total deposits than do their member bank counterparts.

Conclusion This article has shown that state reserve requirements in the Fifth Federal Reserve District applying to smaller sized banks are nonbinding, i.e., nonmember banks' operating cash requirements exceed legally required cash by a substantial margin. An implication of this is that a lowering of state reserve requirement ratios would not cause nonmember banks to reduce their holdings of cash assets. Conversely, Federal Reserve System reserve requirements applying to smaller banks are shown to be binding, i.e., member banks would likely hold fewer cash assets if System requirements were lowered.

On average, Fifth District member banks less than $100 million in asset size maintain higher actual cash asset ratios than similarly sized nonmember banks. This evidence suggests that, on average, member banks hold more cash assets than required purely for operating purposes. The primary reason for this is that only vault cash and deposits with the Federal Reserve, but not correspondent balances, are eligible reserve assets for member banks. These banks hold correspondent balances to pay for correspondent services in addition to holding reservable assets.

It is important to note that this analysis treats all member and nonmember banks alike for purposes of comparison, i.e., the analysis has been limited to discussion of the average cash asset ratios of member

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[6] Including CIPC in the calculations would tend to eliminate any bias toward overstatement in nonmember compared to member bank ratios arising from differences in accounting procedures described in footnote 2. On the other hand, including CIPC would also tend to bias upward member compared to nonmember bank ratios to the extent that member banks act as correspondent clearing banks. These offsetting biases are difficult to measure, and therefore comparisons of actual cash asset ratios that include CIPC are hard to interpret. The basic conclusions reached using the ratios in Table III, however, are not substantially different from those based on ratios including CIPC.

[7] If CIPC are included in the calculations, member banks' actual nonearning cash asset ratios are lower than nonmember banks' ratios in only two of the groups. These are: North Carolina, under $10 million and $25-50 million.

[8] If CIPC are included in the calculations, the unweighted averages show member bank cash asset ratios are higher by 1.39 percent, 1.88 percent, 1.37 percent, and 3.11 percent, in ascending order of asset size.

and nonmember banks. Yet, the article also points out that member banks are not all alike in terms of how heavily they use Federal Reserve System services. It might be that heavy users of System services are able to minimize their due from balances and thereby reduce their overall cash asset ratios. A forthcoming article will examine the effect of use of System services on member bank cash asset positions.

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APPENDIX

The relationship between the data in Tables II and III can be analyzed using regression analysis. Regression of the actual cash asset to total deposit ratios in Table III on the required nonearning cash asset to total deposit ratios in Table II shows no significant correlation between the variables for nonmember banks. For member banks, however, this regression yields a $\bar{R}^2$ of .23 and a significant t-statistic for the right hand variable (the required reserve to total deposit ratio). The regression results are:

$$(1) \quad \left[\frac{\text{Adjusted cash assets}}{\text{Total deposits}} \right]_n = .052 + \underset{(1.102)}{0.608} \text{ X} \left[\frac{\text{Required nonearning assets}}{\text{Total deposits}} \right]_n,$$

with $\bar{R}^2$ = .01 and D.W. = 1.61; and,

$$(2) \quad \left[\frac{\text{Adjusted cash assets}}{\text{Total deposits}} \right]_m = .032 + \underset{(2.629)}{1.316} \text{ X} \left[\frac{\text{Required nonearning assets}}{\text{Total deposits}} \right]_m,$$

with $\bar{R}^2$ = .23 and D.W. = 1.80.

The figures in parenthesis are t-statistics.

These results support the idea that state reserve requirements in the Fifth District are nonbinding, while System reserve requirements are partially binding. The regression results suggest that reserve requirements explain roughly one-quarter of the variation in Fifth District member bank holdings of cash assets.