

MANAGING CASH ASSETS: OPERATING BALANCES AND RESERVE REQUIREMENTS

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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

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 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.

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-

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.

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

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

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 U. S. Govt. securities State of Md. securities Approved obligations of Md. municipalities	at least 66 2/3% of total reserve up to 33 1/3% 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.	
North Carolina	Total demand deposits less collateralized deposits of public funds.	Total time deposits less collateralized deposits of public funds.	\$ millions 0-28% 2-1010% 10-100...12% 100-400...13% over 400...15%	Savings and time open account...3% Other time maturing in 180 days or more3% maturing in less than 180 days 0-5 million3% over 5 million6%	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 Short term U. S. Govt. securities	at least 75% of total reserve up to 25% 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.
West Virginia	Total demand deposits.	Total time deposits.	7%	3%	Vault cash Due from banks CIPC	at least 20% of total reserve	Vault cash Due from banks CIPC	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.
Federal Reserve System ¹	Total demand deposits less CIPC and demand balances due from commercial banks.	Total time deposits.	\$ millions 0-27% 2-109 1/2% 10-100...11 3/4% 100-400...12 3/4% over 400...16 1/4%	Savings ²3% Time 0-5 million ² maturing in 30-179 days ...3% 180 days- 4 yrs2 1/2% 4 yrs or more ..1% Time over 5 million ² maturing in 30-179 days6% 180 days- 4 yrs2 1/2% 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 non-earning 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.

⁵ Tests reviewed in another study [7] suggest that mid-year 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

State	Asset Size Groups, Millions of Dollars							
	Under 10		10-25		25-50		50-100	
	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 DEPOSITS¹

Member and Nonmember Banks by Size Group
Fifth District States
Calculated from 6-30-77 Call Report

State	Asset Size Groups, Millions of Dollars							
	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

⁶Including 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.

⁷If 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.

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

⁸If 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 ser-

vices 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:

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

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

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

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.