Small Banks and the Federal Funds Market

By Carl M. Gambs and Donald V. Kimball

The Federal funds market is one of the most important financial markets in the United States. The market is significant because it allows financial institutions to lend funds to one another for brief periods of time, most commonly for one business day, and because the interest rate on Federal funds plays an important role in monetary policy in the United States.[1] The major participants in the Federal funds market are commercial banks that are members of the Federal Reserve System, but active participants also include nonmember banks, savings and loan associations, and certain federally sponsored credit agencies.[2]

Most studies of the Federal funds market have been concerned primarily with the activity of large banks.[3] This is not surprising because large banks are the predominant institutions in the market. However, small bank activity is also of interest because small banks are major suppliers of funds to consumers, small businesses, and farmers. The degree to which these institutions participate in national financial markets, therefore, is of considerable importance.

This article focuses on the activity in the Federal funds market of small banks in the Tenth Federal Reserve District. The article first examines the activity of District banks in the decade from 1969 through 1978, with particular emphasis on the growth in activity of small banks. The article then analyzes the different ways that small banks use the market. Finally, statistical techniques are used to ascertain what factors affect bank purchases of Federal funds.

This study makes use of daily data on Federal funds activity. The data have been

1 The Federal funds market is a market in which financial institutions trade immediately available funds among themselves. Most other financial markets involve settlements one or more days after the trade takes place.

2 The Federal funds market is frequently thought of as a market in which Federal Reserve member banks trade reserve deposits held in Federal Reserve Banks in order to eliminate reserve excesses or deficiencies. Traditional studies have been based on the assumption that the Federal funds market is predominantly interbank, and that the sum of all commercial banks' demands for Federal funds must be zero. This assumption is faulty because of nonbank institutions' participation in the market.

3 For example, Dennis J. Aigner, "On Estimation of an Econometric Model of Short-Run Bank Behavior," *Journal of Econometrics*, 1 (October 1973), pp. 201-28; Robert H. Cramer and Robert B. Miller, "Multivariate Time Series Analysis of Bank Financial Behavior," *Journal of Financial and Quantitative Analysis*, 13 (December 1978), pp. 1003-17; Bonnie Garrett, *The Erosion of Demand Deposits: An Analysis of the Immediately Available Funds Market,* Ph.D. Dissertation, George Washington University, 1979; Arie Melnik, "Short-Run Determinants of Commercial Bank Investment Portfolios: An Empirical Analysis," *Journal of Finance.* 25 (June 1970), pp. 639-49.

Carl M. Gambs is an assistant vice president and financial economist and Donald V. Kimball is a research associate, both with the Federal Reserve Bank of Kansas City.

provided weekly to the Federal Reserve Bank of Kansas City by all of the approximately 800 member banks in the Tenth Federal Reserve District since September 1968.[4] By utilizing these data, an examination is made of the different uses that individual banks make of the market.

[4] The only data covering all banks are those collected by the Federal bank regulatory agencies on the report of condition at the end of each quarter. Previous research on the Federal funds market has been confined to using either this last-day-of-the-quarter data, or to studying only the Federal funds activity of large banks. The quarterly report of condition data are quite unsatisfactory for a study of bank use of the Federal funds market, since there is reason to believe that use of the market may be different on the days when financial statements are published than on more normal days. Furthermore, since the use of the market varies widely from one day to another, data for one or at most four days a year are not satisfactory for an assessment of the degree to which banks use the Federal funds market.

In spite of the importance of the Federal funds market, only a limited amount of data on the market is currently available, and these data lump Federal funds with repurchase agreements (RP's). Closely related to the Federal funds market is the market in RP's on U.S. Government and Federal agency securities, in which immediately available funds are traded by one party selling securities to another with an agreement that they will be repurchased at a later date. Banks generally acquire RP funds from parties that do not have access to the Federal funds market—for example, nonfinancial corporations. Since RP's and Federal funds are alternative sources of funds for banks, the markets are closely tied together. However, the small banks in the Tenth District that are the subject of this article do not normally participate in the RP market, except for a small amount of interbank RP activity, which is essentially trading in secured Federal funds.

For recent discussions of the Federal funds and RP markets, see Raymond E. Lombra and Herbert M. Kaufman, "Commercial Banks and the Federal Funds Market: Recent Developments and Implications," *Economic Inquiry,* 16 (October 1978), pp. 549-62; Charles M. Lucas, Marcos T. Jones, and Thom B. Thurston, "Federal Funds and Repurchase Agreements," Federal Reserve Bank of New York, *Quarterly Review,* 2 (Summer 1977), pp. 33-48; Thomas D. Simpson, "Recent Developments in the Federal Funds and Repurchase Agreement Markets and Implications for Demand for Demand Deposits and Monetary Control," paper prepared for Southern Economic Association Meetings, Washington, D.C., November 10, 1978; and Thomas D. Simpson, "The Market for Federal Funds and Repurchase Agreements," Board of Governors of the Federal Reserve System, Staff Studies 106, July 1979.

GROWTH OF THE FEDERAL FUNDS MARKET IN THE TENTH DISTRICT 1969-79

The growth of the Federal funds market in the Tenth District has been especially marked in the past decade. District member banks increased their purchases of Federal funds from an average of $198 million in the first quarter of 1969 to around $3,100 million in the first quarter of 1979. During the same period, sales of Federal funds rose from $168 million to $2,530 million. Increases in Federal funds purchases and sales represent more than simply the growth in the scale of the banking system. Transactions in Federal funds relative to total assets increased sharply in the early 1970s (Chart 1). By 1975, both sales and purchases as a percentage of total assets increased to over 7 per cent, compared with less than 2 per cent in 1969. Transactions relative to assets fell in the latter half of the 1970s, but remained well above 1969 levels.

Purchases of Federal funds by District member banks increased more than sales during the 1969-79 period, and in recent years these banks in the aggregate have been net purchasers of funds. Prior to 1969, District banks as a whole were always net sellers.[5] As shown in Chart 2, however, net Federal funds purchases were positive in 1969, the first time on record that purchases by Tenth District member banks were greater than sales. Since 1969, the amount of net Federal funds purchased by Tenth District member banks has fluctuated over a wide range. In particular,

[5] J. A. Cacy, "Tenth District Banks in the Federal Funds Market," Federal Reserve Bank of Kansas City, Monthly *Review,* November 1969.

Chart 1
GROSS FEDERAL FUNDS PURCHASES AND SALES OF TENTH DISTRICT MEMBER BANKS
(Percent of Total Assets)

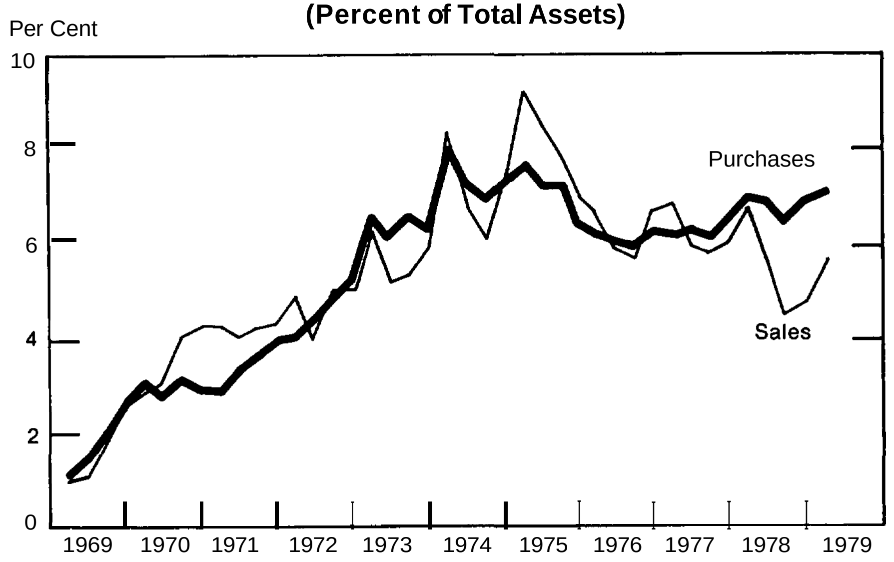
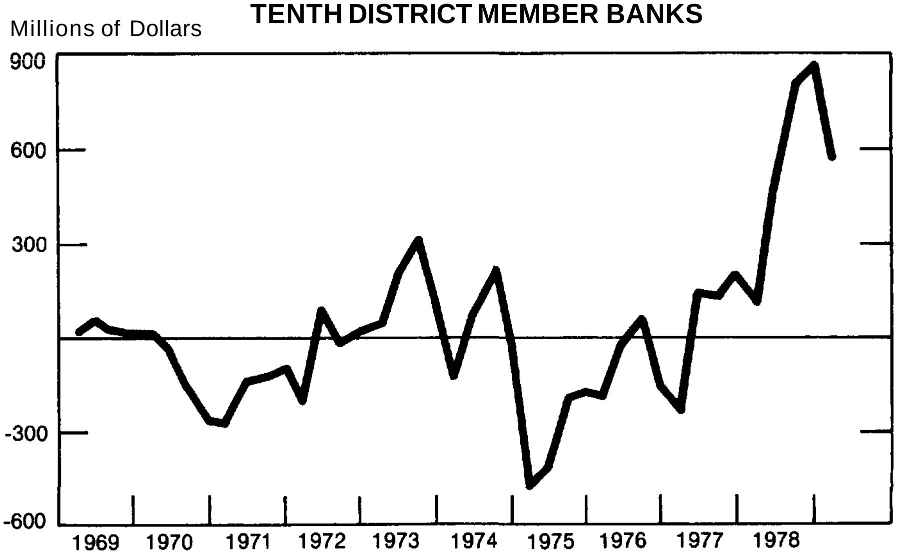


Chart 2
NET FEDERAL FUNDS PURCHASES OF TENTH DISTRICT MEMBER BANKS



member banks were net purchasers of funds during the tight credit periods of **1969-70** and **1973-74,** and during **1978** net purchases reached record levels.[6]

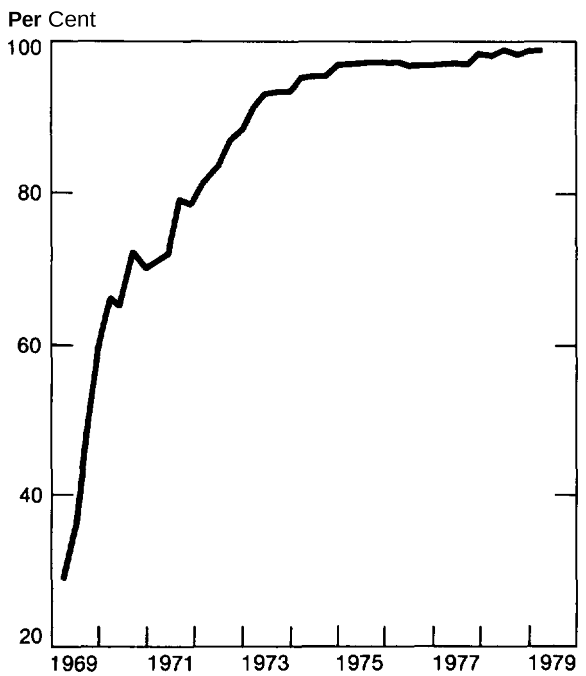
Participation by District member banks in the funds market has become pervasive during the **1970s.** The proportion of member banks participating in the market either as buyers or sellers rose from **30** per cent at the start of **1969** to over **99** per cent at the end of **1978.** Most of the increase in the proportion of participating banks had occurred by **1973** (see Chart **3.)**

The increase in participation of District member banks reflects an increase in small bank participation. Larger banks—those with total assets greater than $50 million—had at least one transaction in the Federal funds market in every quarter over the last **10** years. However, as Table 1 shows, a sharp change has occurred in small bank participation. In **1969, 585,** or **75** per cent, of the **783** small member banks—those with total assets of $50 million or less—had no Federal funds transactions. By **1973,** the number of small banks not participating had declined to **66,** or **9** per cent of all small District member banks. The decrease in nonparticipation continued throughout the **1970s** until there were only six member banks in the Tenth District that were neither purchasers nor sellers of Federal funds in the first quarter of **1979.**

Most small District member banks are, and historically have been, net sellers of Federal funds. In **1979, 81** per cent of the **635** small District member banks were net sellers. Of the **517** net sellers, **54** per cent sold funds in amounts averaging up to 5 per cent of their total assets, **28** per cent sold funds that amounted to between **5** and **10** per cent, and **18** per cent sold funds in amounts that were on average greater than **10** per cent of their assets.

Contrary to commonly held views, many small banks also purchase Federal funds. Since **1969,** moreover, the number of small banks that are net purchasers has increased. In the first quarter of **1979, 89** small member banks purchased Federal funds in amounts averaging up to **5** per cent of total assets, **16** purchased funds in amounts between **5** and **10** per cent of

Chart 3
PER CENT OF TENTH DISTRICT MEMBER BANKS PARTICIPATING IN THE FEDERAL FUNDS MARKET



[6] **The movement to a substantial net purchase figure does not necessarily mean that the rest of the United States is supplying funds to the Tenth District. These data include member bank purchases of Federal funds from a number of nonmember institutions. Furthermore, the data include bank purchases of funds under RP's which have increased dramatically in recent years.**

Table 1
DISTRIBUTION OF SMALL TENTH DISTRICT MEMBER BANKS ACCORDING TO NET FEDERAL FUNDS POSITION*

	Net Purchasers			Net Sellers			No Activity	Total Number†
	0-5%	5-10%	>10%	0-5%	5-10%	>10%		
1969	48	2	0	125	16	7	585	783
1970	60	12	1	260	110	56	278	777
1971	45	5	2	293	116	65	226	752
1972	68	7	3	295	141	96	148	758
1973	58	11	1	259	192	156	66	743
1974	30	5	1	243	174	244	35	732
1975	20	5	2	251	230	215	21	734
1976	61	6	2	356	172	102	17	716
1977	83	11	0	313	193	77	20	697
1978	72	8	2	257	223	94	10	666
1979	89	16	7	278	145	94	6	635

*This distribution is based upon the quarterly average of daily data for the first quarter of each year. The banks categorized as purchasers or sellers are subdivided according to the net Federal funds position as a per cent of total assets.
†The number of banks in this size group was affected over time as some banks increased from under $50 million in total assets to over $50 million in total assets, and as some banks dropped membership in the Federal Reserve System and others joined the System.

assets, and seven purchased funds in amounts that exceeded 10 per cent.

In summary, almost all small Tenth District member banks presently participate in the Federal funds market, and an increasing number are net purchasers of funds. Furthermore, some banks' transactions are quite large relative to their assets.

USE OF THE FEDERAL FUNDS MARKET

This section analyzes the different ways that small banks use the Federal funds market. The analysis employs data from a random sample of 100 Tenth District banks, all of which had less than $50 million in deposits in the fourth quarter of 1978 and had been Tenth District member banks for the entire 1969-78 period.[7]

Banks that use the Federal funds market can be divided into three groups: (1) those that are generally net purchasers of funds, (2) those that are generally net sellers of funds, and (3) those that both buy and sell funds. Banks that are generally net buyers are using the market as a permanent source of funds. Those that are regular net sellers use Federal funds sold as a "secondary reserve asset."[8] Banks that are net buyers in a number of periods and net sellers in

7 This restriction, which was necessary to analyze deposit and loan variability over the 10-year period, meant the elimination of banks that were formed during this period, as well as banks that joined the Federal Reserve System and the banks that were transferred into the Tenth District as a result of changes in the boundaries between Federal Reserve Districts. Banks that were involved in mergers during this period were also excluded.

8 A good discussion of the concept of secondary reserve assets is in Roland I. Robinson, The *Management of Bank Funds,* 2nd ed. (New York: McGraw-Hill, 1962).

a number of other periods use the market as a means of adjusting reserve surpluses and deficits.

Varying Use of the Market

While all of the sample banks used the Federal funds market in **1978,** there were substantial differences in usage. Table 2 categorizes banks by the number of weeks they were net buyers as a percentage of the number of weeks they participated in the market. Specifically, banks purchasing funds in more than **75** per cent of the weeks they participated are classified as generally purchasers, while those buying in less than 25 per cent of the weeks (or selling in more than **75** per cent) are termed generally sellers. Banks that had net purchases between 25 and **75** per cent of the weeks are classified as both buyers and sellers. The table shows that 6 of the **100** banks were generally net purchasers, 73 were generally sellers, and 21 were both. Of the 73 net sellers, **45** banks did not purchase funds in **1978.**

A closer examination of the data revealed that a number of the net selling banks sold

Table 2
CHARACTERISTICS OF FEDERAL FUNDS TRANSACTORS-1978*

	Generally Purchasers	Both Purchasers and Sellers			Generally Sellers		
		Total	50-75%	25-50%	Total	0-25%	No Purchases
No. of Banks	6	21	8	13	73	28	45
No. of Holding Company Banks	2	7	4	3	3	2	1
Loan/Deposit Ratio:†							
Sample Banks	.81	.73	.74	.72	.61	.64	.59
Bank's County	.67	.67	.68	.66	.63	.62	.64
Ave. Total Assets (mill. of $)	23.1	29.6	31.9	28.2	18.4	21.2	16.6
Variance of % Change in:‡							
Total Deposits	9.0	22.9	15.7	27.3	3.8	4.0	3.7
Total Deposits Plus Net Federal Funds	5.9	7.7	5.0	9.3	2.6	3.7	1.9
No. of SMSA Banks	2	7	3	4	8	2	6
Previous Purchases§	186	93	123	74	23	38	14

*Source of data is from a random sample of 100 Tenth District member banks with total deposits less than $50 million. Definition of categories: generally purchasers are banks that had net Federal funds purchases for more than 75 per cent of the time they were active in the market; both purchasers and sellers are subdivided according to the per cent of time they were net purchasers when active in the market; generally sellers are classified as banks that only have net purchases less than 25 per cent of time and banks that never purchase.

†Loan/deposit ratios were calculated using June 1978 call report data.

‡Variance of percentage change was calculated for the sample of 100 banks. The means of these variances were then computed.

§Average number of weeks in the period 1969-77 that banks purchased Federal funds.

funds in substantial amounts relative to their assets. There were 39 banks with net sales in amounts averaging at least 4 per cent of total assets during the year and five banks with net sales of more than 10 per cent of assets on average. These Federal funds positions were frequently almost static, remaining unchanged for weeks at a time, even though all reported Federal funds positions were nominally a result of one-day transactions.[9] For 15 of the banks, there were periods of three or more weeks in which the position remained unchanged, with one bank having a 20-week period of no change in its net Federal funds sold position.

Reasons for Varying Use

There are several factors that might be expected to affect the way banks use the Federal funds market. One is differences in management attitude and knowledge among small banks. Banks with more sophisticated or aggressive management practices may be more likely to purchase Federal funds either because of better knowledge of the market or a greater willingness to depend on Federal funds as a source of funds.

While attitude and knowledge are impossible to measure, banks that are subsidiaries of multibank holding companies might be considered to have relatively more sophisticated and/or aggressive management. Therefore, these banks might tend to be net buyers of Federal funds. Table 2 suggests that this may indeed be the case. Only 1 of the 13 holding company banks in the sample did not purchase funds, while 45 out of the 100 banks in the sample did not purchase funds. Furthermore, sophisticated and/or aggressive banks may tend to have high ratios of loans to deposits relative to banks in the same loan market. Thus, banks with relatively high loan-deposit ratios may tend to be net purchasers of Federal funds.[10] Table 2 shows that banks that were generally purchasers of Federal funds had substantially higher ratios of loans to deposits than did all banks in their counties, while banks that were generally sellers had loan-deposit ratios that differed little from the ratios of other banks in the same county.[11]

Loan demand is another factor that may affect the way small banks use the Federal funds market. Banks with greater loan demand might be expected to partly satisfy the demand by purchasing funds. The loan-deposit ratio for all banks in a bank's county may be used as a measure of loan demand. However, Table 2 shows that differences in loan demand in the different groups appear to be relatively slight, although it does appear that banks which are generally sellers may have slightly lower loan demand.

The sue of a bank may also affect the bank's Federal funds activity. Most of the studies that have been made about bank size and Federal funds activity refer to comparisons between sues of banks examined here and much larger banks. However, looking only at small banks, Table 2 does suggest that banks that are generally sellers of Federal funds have somewhat lower total assets than do banks that purchase funds more frequently.

The volatility of deposits is another factor that may be important because the Federal funds

9 These positions usually result from a continuing contract where the Federal funds transaction is automatically renewed each day until terminated by one of the parties.

10 There may be some bias in relating loan-deposit ratios to Federal funds purchases, since a loan financed by a Federal funds purchase automatically results in a higher loan-deposit ratio. However, since dollar changes in loans are much higher than dollar changes in Federal funds purchases, this is not believed to be a serious problem.

11 This view, that purchasers of funds are more aggressive, is reinforced by the fact that these banks also had substantially lower ratios of Government securities to assets than did banks that only soldfunds, and aggressive banks would be expected to hold fewer Government securities.

market can be used by banks to offset fluctuations in deposit levels. Banks with highly variable deposits may be more likely to purchase Federal funds to offset deposit outflows. Table 2 shows that banks generally purchasing funds and banks with both purchases and sales had more volatile deposits than did other banks. It is interesting to note that when net Federal funds purchased is added to deposits, a substantial reduction in variability occurs. This indicates that Federal funds play a major role in offsetting deposit volatility.

One of the arguments for the establishment of the seasonal borrowing privilege at the Federal Reserve discount window was that small banks, both because they are small and because they are frequently in rural areas, do not have the ability to easily purchase Federal funds.[12] If this argument is valid, a higher proportion of banks in standard metropolitan statistical areas (SMSA's) would be expected to be purchasers of funds. However, Table 2 shows that while a larger proportion of the banks that generally purchase funds or who both purchase and sell funds is in SMSA's, the majority of banks in all classes are located outside SMSA's.

Finally, some banks may overestimate the difficulty of obtaining funds in the Federal funds market. If this is the case, the degree to which a bank has previously purchased funds may affect its use of the market. Table 2 shows experience as measured by the number of weeks in the 1969-77 period in which the average bank purchased Federal funds. The table suggests a direct relationship between prior purchases and Federal funds purchases in 1978.

In summary, evidence presented in this section suggests that factors such as bank management, size, experience, and deposit variability may affect the extent to which small banks are net purchasers of Federal funds. The evidence suggests that factors such as loan demand and geographical location may not affect usage. The following section presents a more rigorous statistical analysis of the factors affecting small bank activity in the market.

A STATISTICAL ANALYSIS OF FUNDS PURCHASES

To more accurately determine the extent to which various factors affect Federal funds activity at small banks, a linear regression equation was estimated. In the equation, the dependent variable measures the extent that a bank is a net purchaser of Federal funds as shown by the number of weeks in 1978 that a bank was a net purchaser. The independent variables measure the aggressiveness and/or sophistication of the bank, loan demand faced by the bank, the size of the bank, the bank's geographical location, the variability of the bank's loans and deposits, and the bank's experience in the Federal funds market. Aggressiveness and/or sophistication was measured by the difference between the bank's loan-deposit ratio and the loan-deposit ratio in the bank's county, and by a dummy variable indicating holding company affiliation. The loan-deposit ratio in the bank's county was used to measure loan demand. The size of the bank was measured by total. assets, and experience by the number of weeks in the 1969-77 period that the bank was a purchaser of Federal funds. To measure volatility in deposits and loans, the variability of percentage changes in the loan-deposit ratio was used, with a distinction made between variability that can be explained by trend and seasonal factors and variability that is unexplained.[13] Dummy variables were used to test the hypothesis that location in an SMSA affected purchases of Federal funds. The estimated equation including only the

[12] Federal Reserve System Steering Committee, "Report of a System Committee," p. 15, in Board of Governors of the Federal Reserve System, ***Reappraisal of the Federal Reserve Discount Mechanism,*** Vol. 1, Washington, 1971.

statistically significant variables was of the form:

$$P = -3.688 - \underset{(-2.93)}{0.868}\ V_e + \underset{(4.21)}{3.019}\ V_u + \underset{(2.65)}{20.522}\ LD +$$
$$(-1.73)$$

$$\underset{(1.88)}{0.142}\ TA + \underset{(4.38)}{0.149}\ FF - \underset{(-1.65)}{0.00017}\ FF^2$$

$\bar{R}^2 = .53$ $F = 9.46$ **(t values in parentheses)**

where

P = the number of weeks in 1978 that the bank was a net purchaser of Federal funds,

V_e = the portion of the variance of percentage changes in loan-deposit ratios explained by trend and seasonal factors,

V_u = the portion of the variance of percentage changes in loan-deposit ratios not explained by trend and seasonal factors,

LD = the loan-deposit ratio of the bank minus the loan-deposit ratio of its county,

TA = total assets (in millions of dollars), and

FF = the number of weeks in the 1969-77 period that the bank was a purchaser of funds.

[13] It was felt that it would be desirable to take into account volatility in loans, as well as in deposits, since loans also vary substantially in ways that the bank has little control over in the short run. Loans are sometimes paid off early and a bank has no power to force its customers to accept new loans. More importantly, a bank that wants to maintain a good customer must stand ready to make loans on demand when the customer needs the funds. Explained and unexplained variability were obtained from a regression estimating the first difference of the natural logarithms of the loan-deposit ratio on seasonal dummy variables using weekly data for the period 1969-78. First differences of natural logarithms approximate percentage changes.

The statistical results indicate that the management of a bank systematically affects the way small banks use the Federal funds market. More sophisticated and/or aggressive banks tended to purchase funds more frequently than less aggressive and/or sophisticated ones. This result is indicated because the LD variable—one of the variables used to measure differences in management—was statistically significant and had a positive sign. However, the other management variable—the holding company variable—was not significant.

The statistical results also indicate that bank size affects Federal funds usage. Large banks tended to purchase funds more often than small banks, as indicated by the positive sign of the TA variable. Experience was found to be an additional factor. Banks that purchased funds more frequently in the past tended to purchase more during the period studied. This is shown by the positive sign on the FF variable. The negative sign of the square of the FF variable indicates that, while experience is important, its added impact diminishes as greater experience is accumulated.

Deposit variability is another factor that was found to affect the way the Federal funds market is used. Banks with relatively high unpredictable variability in their loan-deposit ratio tended to purchase funds more frequently than other banks, as indicated by the positive sign of the V_u variable. The V_e variable—which is the predictable part of the variability in loan-deposit ratio—showed a negative sign, indicating that banks with a relatively high, predictable loan-deposit variability tended to purchase funds less often. This result, along with the positive sign of the V_u variable, suggests that banks with predictable cash flow variability prepare for outflows by building up their Federal-funds-sold position, while banks with unpredictable variability purchase funds to meet unexpected cash flow drains.[14]

The statistical results do not indicate that either loan demand faced by the bank or geographical location affect the way small banks use the Federal funds market. Both the variable used to measure loan demand—the county loan-deposit ratio—and the variable used to measure geographical location—an SMSA dummy variable—were found not to be statistically significant.

SUMMARY AND CONCLUSIONS

The use of the Federal funds market by small banks is, unlike the situation a decade ago, virtually universal. While most small banks are still primarily sellers of Federal funds, there are many small banks that also purchase funds in this market. This study suggests that differences in loan-deposit variability, bank size, aggressiveness in lending behavior, and experience in purchasing Federal funds are important determinants of the extent to which banks purchase Federal funds. Bank location, loan demand, and membership in a holding company seem to have little effect.

The importance of aggressiveness in lending and experience in determining Federal funds activity may be related to differences in management and stockholder attitudes toward risk. However, it also seems possible that some small banks may at times be overlooking profitable opportunities to acquire Federal funds. Banks that have never obtained funds from the Federal funds market may want to explore this source.

[14] Since there are only 52 weeks in a year, increases in the number of weeks in which funds are sold mean that funds are purchased in a fewer number of weeks than would otherwise be the case.