Checking Accounts: What Do Banks Offer and What Do Consumers Value?

Joanna Stavins

Economist, Federal Reserve Bank of Boston. *The author thanks Bank Rate Monitor and the Federal Reserve's Financial Services Research Group for supplying the data. Helpful comments were provided by Katharine Bradbury, Lynn Browne, John Jordan, and Richard Kopcke. Marie Willard provided valuable research assistance.*

Despite predictions that we would live in a checkless environment by the end of the century, the number of checks per capita continues to grow in the United States (Mayer 1996). It is now obvious that most of us consider checks to be a convenient way of making payments. Although paper checks are by far the most common method of noncash payment, little is known about the effect of the many fees or restrictions that financial institutions impose on their depositors. Only limited anecdotal evidence exists on the effect of checking account features on bank customers, and no estimates exist of how depositors respond to the various attributes. This study uses detailed data from a national survey of checking accounts to characterize checking account features and to estimate depositors' sensitivity to checking account charges, including fees for check return and for using live teller services and ATMs not owned by the bank.

Financial institutions bundle the charges and features, typically offering their customers a choice of "packages." Besides the traditional checking account features such as minimum-balance requirements, minimum to open an account, and per-item fees, some financial institutions have been charging their account holders for returning canceled checks or using teller services instead of ATMs. The latter charges are designed to induce depositors to adopt services that lower the banks' costs. But these "new" options are offered by few financial institutions. The reason may lie either on the cost side—the features may be too expensive to be cost effective for the banks—or on the demand side—eliminating check return or charging for using live bank tellers may lower the supply of deposits because of high consumer sensitivity. The supply of deposits to checking accounts has been found not to respond to interest rates paid (Amel and Hannan 1998). This article examines whether specific fees and other features of checking accounts are important determinants of the supply of deposits. In addition, the study estimates the effect of checking account fees on the banks' revenues.

The article is organized as follows. The first section describes the data used in the study. Section II compares minimum-balance and no-minimum-balance checking accounts and discusses the trade-off between the two types, while section III focuses on restrictions on the return of canceled checks. The following section estimates the effect of various fees on the supply of deposits to checking accounts and on banks' revenues from the fees. Section V offers some conclusions.

I. The Data

The data used in this article are a cross-section of checking accounts offered by U.S. financial institutions. The data came from a survey of checking accounts conducted by Bank Rate Monitor (BRM) in July 1997. BRM began conducting the survey in 1997 and repeats it every six months, although the questions and the participating institutions change somewhat from one survey to the next. The data were collected from 250 financial institutions—five banks and five thrifts in each of the 25 largest U.S. metropolitan areas.[1] Each institution provided data on all of the checking accounts it offered (between one and five different accounts), yielding 745 observations in the sample. Money market and other savings accounts were excluded, as were accounts tied to other types of accounts in the same bank.

The supply of deposits to checking accounts has been found not to respond to interest rates paid. Specific fees and other features may be more important to customers.

The Board of Governors of the Federal Reserve System reports average retail fees charged by depository institutions each year,[2] but little is known about the specific features and charges that checking accounts carry. The data used in this study allow for a detailed look at those characteristics. Table 1 defines the main features of checking accounts and Table 2 lists the markets that were surveyed. Table 3 provides summary statistics for the main attributes of the checking accounts in the survey. The survey data were merged with quarterly data from Consolidated Reports of Condition and Income (Call Reports) on assets and deposits for each bank. Each bank reports data on several types of deposits. Because this study deals with checking accounts, deposits in interest-bearing checking accounts and in non-interest-bearing accounts were used. The survey targets large institutions—the average asset size for the sample is $19.5

Table 1
Definitions of Terms

Name of Variable	Account Feature
interest	1 if account pays interest, 0 otherwise.
min_open	Minimum balance to open an account.
min_bal	Minimum average balance to avoid fees. If balance falls below this amount, the account will be charged a monthly fee.
mo_fee	Monthly fee.
translim	1 if number of free transactions is limited, 0 otherwise.
num_trans	Number of free transactions per month (ATM or check).
per_item	Per-item charge for transactions in excess of the number of free transactions if an account holder did not meet minimum balance requirements.
nsf	Non-sufficient funds fee charged if an account has insufficient funds to pay the check.
restrict	1 if there are any restrictions on the return of canceled checks, 0 otherwise.
chk_ret	1 if canceled checks not returned with monthly statement, 0 otherwise.
ret_fee	Fee for each returned canceled check.
image	Digital images returned instead of physical canceled checks.
teller	Bank restricts the use of live tellers (monthly or per-use fee).
atm_own	Fee charged for use of an ATM that is owned by the customer's bank.
atm_oth	Fee charged for use of an ATM that is not owned by the customer's bank. Does not include fees the ATM's owner-bank may charge.
totbranch	Bank's total number of branches.
branch	Bank's number of branches in state.
headquarters	1 if bank headquarters, 0 otherwise.

[1] The terms "bank" and "financial institution" are used interchangeably here to denote a commercial bank or a thrift.

[2] Board of Governors of the Federal Reserve System, "Annual Report to the Congress on Retail Fees and Services of Depository Institutions."

Table 2
Markets Included in the Survey

Atlanta	Milwaukee
Baltimore	Minneapolis
Boston	New York
Chicago	Philadelphia
Cincinnati	Phoenix
Cleveland	Pittsburgh
Dallas	San Diego
Denver	San Francisco
Detroit	Seattle
Houston	St. Louis
Kansas City	Tampa
Los Angeles	Washington, DC
Miami	

billion, the range from $19 million to $161 billion. Because the large banks hold a vast majority of the country's deposits, the sample provides a good overview of checking accounts in the United States.[3]

Checking accounts can be grouped according to their characteristics. One way is to separate interest-bearing accounts from non-interest-bearing accounts. Customers who earn interest on their checking account balances typically compensate by meeting stricter requirements (Table 4). The minimum amount required to open a non-interest-bearing account averaged $81, compared to $333 for an interest-bearing account. The minimum balance that had to be maintained in an account to avoid paying monthly fees averaged only $348 for non-interest-bearing accounts, but $1,634 for interest-bearing accounts. The average monthly fee to be paid if the minimum is not maintained was $5.50 for non-interest-bearing accounts and $9.15 for interest-bearing accounts.

On the other hand, non-interest-bearing accounts imposed more limitations that reduce banks' costs in such areas as check return and teller use. Overall, 31 percent of accounts had some restrictions on check return, but the fractions were 37 percent for non-interest-bearing accounts and 23 percent for interest-bearing accounts. Approximately 23 percent of non-interest-bearing accounts and 15 percent of interest-bearing accounts charged a monthly fee to customers requesting their canceled checks. The most common fee was $1 a month, although in a few cases it was as high as $5 per month for non-interest-bearing accounts. Over 20 percent of non-interest-bearing accounts and 8 percent of interest-bearing accounts did not return checks at all.

Accounts that provide customers with images instead of physical checks are still rare: Only 1.5 percent of accounts substituted images for physical checks. Limiting the usage of tellers was more frequent, with 4.8 percent of accounts imposing some type of teller restriction, typically limiting the number of times a teller can be used during a month. Seven percent of non-interest-bearing accounts and 2 percent of interest-bearing accounts imposed limits on teller use. Thirty-three percent of non-interest-bearing accounts and 12 percent of interest-bearing accounts limited the number of free transactions.

Table 3
Summary Statistics for the Checking Accounts Surveyed

Variable	Mean	Standard Deviation	Minimum	Maximum
interest	.420	.494	0 (No)	1 (Yes)
restrict	.312	.464	0 (No)	1 (Yes)
ret_fee ($)	.356	.797	0	5
image	.015	.121	0 (No)	1 (Yes)
teller	.048	.215	0 (No)	1 (Yes)
min_open ($)	186.765	496.275	1	5000
nsf ($)	20.823	5.052	10	30
atm_oth ($)	1.244	.392	.4	2
chk_ret	.153	.360	0 (Yes)	1 (No)
num_trans	11.872	12.168	0	50
translim	.242	.428	0 (No)	1 (Yes)
atm_own ($)	.013	.103	0	1
min_bal ($)	887.234	1531.289	0	15000
mo_fee ($)	7.059	4.061	0	25
per_item ($)	.126	.248	0	1.5
assets ($)	19.5 billion	33.7 billion	19 million	161 billion
deposits ($)	14.2 billion	22.8 billion	8.7 million	111 billion
totbranch	243.486	406.925	1	1839
branch	91.455	122.000	1	623
headquarters	.088	.283	0 (No)	1 (Yes)

Source: Bank Rate Monitor July 1997 survey and author's calculations.

[3] According to the FDIC, 44 percent of bank deposits are in banks and thrifts with assets above $10 billion.

Table 4
Descriptive Statistics for Interest-Bearing and Non-Interest-Bearing Checking Accounts

Non-Interest-Bearing Accounts				
Variable	Mean	Standard Deviation	Minimum	Maximum
restrict	.374	.484	0	1
ret_fee	.423	.874	0	5
image	.016	.127	0	1
teller	.069	.255	0	1
min_open	80.731	140.709	1	2500
nsf	20.754	5.225	10	30
atm_oth	1.277	.385	.4	2
chk_ret	.204	.403	0	1
num_trans	11.355	10.936	0	50
translim	.329	.470	0	1
atm_own	.013	.102	0	1
min_bal	347.921	724.123	0	10000
mo_fee	5.532	3.505	0	25
per_item	.185	.295	0	1.5
Interest-Bearing Accounts				
Variable	Mean	Standard Deviation	Minimum	Maximum
restrict	.227	.419	0	1
ret_fee	.274	.683	0	3.5
image	.013	.113	0	1
teller	.019	.137	0	1
min_open	332.773	722.709	1	5000
nsf	20.917	4.810	10	30
atm_oth	1.196	.398	.4	2
chk_ret	.083	.276	0	1
num_trans	13.789	15.966	0	50
translim	.121	.327	0	1
atm_own	.013	.105	0	1
min_bal	1633.974	1977.847	0	15000
mo_fee	9.153	3.836	0	25
per_item	.043	.118	0	.75

Beyond that limit, the average per-check fees were 19 cents and 4 cents, respectively.

II. Minimum-Balance versus No-Minimum-Balance Accounts

Customers who open a checking account have several choices. One type of account may prove to be more cost-effective for some customers, but more expensive for others.[4] The most pronounced distinction is between minimum-balance and no-minimum-balance accounts. Table 5 compares the two account types. No-minimum-balance checking accounts offer less: They are more likely to pay no interest, safekeep checks (that is, return a monthly statement only, without canceled checks), or impose higher fees for returned checks. They also are more likely to restrict teller services, allow a lower number of free transactions, and have higher per-item fees. In return, they charge lower monthly fees (although the monthly fees are waived on minimum-balance accounts if the minimum is maintained throughout the month) and they require a lower minimum to open an account.

Table 5
Descriptive Statistics for No-Minimum-Balance Accounts and Minimum-Balance Checking Accounts

No-Minimum-Balance Accounts				
Variable	Mean	Standard Deviation	Minimum	Maximum
restrict	.463	.500	0	2
ret_fee	.538	.982	0	5
image	.018	.135	0	1
teller	.103	.304	0	1
min_open	82.864	311.862	1	5000
nsf	20.630	5.092	10	30
atm_oth	1.271	.421	.4	2
chk_ret	.282	.451	0	1
num_trans	8.826	6.844	0	50
translim	.425	.495	0	1
atm_own	.007	.069	0	.75
mo_fee	3.885	3.066	0	12
per_item	.242	.329	0	1.5
Minimum-Balance Accounts				
Variable	Mean	Standard Deviation	Minimum	Maximum
restrict	.223	.417	0	1
ret_fee	.268	.676	0	3.5
image	.013	.112	0	1
teller	.017	.129	0	1
min_open	246.739	568.695	1	5000
nsf	20.945	5.031	10	30
atm_oth	1.23	.373	.4	2
chk_ret	.079	.269	0	1
num_trans	17.344	16.917	0	50
translim	.136	.343	0	1
atm_own	.016	.118	0	1
min_bal	1401.49	1727.597	2	15000
mo_fee	8.879	3.389	0	25
per_item	.059	.150	0	1

[4] See Carraro and Thornton (1986) for a comparison across four types of accounts that prevailed in the 1980s.

Holding money in a minimum-balance account is costly—the minimum balance could earn higher interest elsewhere—but those accounts carry lower fees. Below we calculate the opportunity cost of holding money in a minimum-balance account relative to a no-minimum-balance account. We assume that the minimum-balance account pays interest (most do) equal to the average interest on a NOW account. An account holder has a choice:

1. Choose the minimum-balance account, keep the required amount in the account, and thus forgo the higher interest the balance could earn elsewhere, but avoid the fees that are attached to a no-minimum-balance account.
2. Choose the no-minimum-balance account, deposit the money in a savings account instead, and pay the higher fees.

The forgone interest for option 1 is as follows:

$$r = \text{min\_bal} \times (i_S - i_C) \times (1 - t)/12, \qquad (1)$$

where r is the forgone monthly interest, min_bal is the minimum balance that has to be kept in the account to avoid fees, i_S is the annual interest rate in a savings account, i_C is the annual interest rate in the checking account, and t is the income tax rate.

No-minimum-balance checking accounts are more likely to pay no interest, safekeep checks, or impose higher fees. In return, they charge lower monthly fees and they require a lower minimum to open an account.

According to the 1995 Survey of Consumer Finances, the median value of deposits held by a household in all transaction accounts was $2,100 (Kennickell, Starr-McCluer, and Sunden 1997, p. 9). However, to calculate the opportunity cost of holding money in a checking account, we assume that a household holds just the minimum that is required to avoid fees. To calculate the forgone monthly interest, we use the average minimum balance for the accounts with minimum balance in the sample, and the average interest rates on deposits paid by U.S. banks on savings and NOW accounts, respectively (2.85 percent and 1.98 percent according to the November 1996 *Federal Reserve Bulletin*). The before-tax cost of forgone interest is $1.016 per month. Assuming a marginal tax rate of 28 percent,[5] the after-tax forgone interest is $0.73 per month. It is worth noting that fees levied on checking accounts are paid out of after-tax income. Thus, an account holder who earns interest on balances that are below the minimum required to avoid fees may possibly have to pay taxes, even if his net income from the account is negative.

Next, we calculate the average cost of holding a no-minimum-balance account relative to a minimum-balance account (expressed in $ per month):

$$\begin{aligned} c = {} & \text{mo\_fee}_N + (\text{ret\_fee}_N - \text{ret\_fee}_M) \\ & \times 20 + (\text{teller}_N - \text{teller}_M) \times 3 \\ & + (\text{atm\_own}_N - \text{atm\_own}_M) \times 5 \\ & + (\text{atm\_oth}_N - \text{atm\_oth}_M) \times 1 \\ & + [(20 - \text{num\_trans}_N) \times \text{per\_item}_N \\ & - (20 - \text{num\_trans}_M) \times \text{per\_item}_M] \\ & + (\text{chk\_ret}_N - \text{chk\_ret}_M) \times 1 \end{aligned} \qquad (2)$$

where:

c is the difference in the monthly cost of a no-minimum-balance account compared with a minimum-balance account;
N subscript denotes no-minimum-balance accounts;
M subscript denotes minimum-balance accounts;
mo_fee is the average monthly fee charged for the account;[6]
ret_fee is the average fee for a returned canceled check;[7]
teller is the fraction of accounts that have fees for using teller services;[8]
atm_own is the average fee for using a bank's own ATM;[9]
atm_oth is the average fee for using other banks' ATMs;

[5] This is the marginal federal income tax rate on annual income above $42,000 for married couples filing jointly. The rate is 15 percent for households with lower annual income. State income taxes are not considered here, but they are unlikely to have an important effect on the result.

[6] Although both types of accounts carry monthly fees, the fees are waived on the minimum-balance accounts as long as the minimum balance is maintained.

[7] An average person writes approximately 20 checks per month.

[8] Although the monthly fees for using teller services vary, $3 is a common value.

[9] On average, households use ATMs approximately five to six times a month (Avery et al. 1987). We assume that an average account holder uses another bank's ATM once a month and his bank's own ATM five times a month.

num_trans is the average number of free transactions;[10]
per_item is the average per-item charge for additional transactions;
chk_ret is the fraction of accounts that do not return checks with monthly statements.[11]

Customers without liquidity constraints are better off with minimum-balance accounts. However, a substantial fraction of consumers do not have sufficient funds to meet the minimum-balance requirements.

Plugging in the average values for the sample yields c equal to $12.298. On average, it costs $12.30 per month to maintain a no-minimum-balance account instead of a minimum-balance account. The interest that could be earned by putting the minimum balance in a savings account does not compensate for the higher charges. The opportunity cost of holding a no-minimum-balance account (that is, monthly charges minus interest that could be earned) is $11.28 per month.

Another alternative is to select a minimum-balance account, but instead of maintaining the balance, keep the money in a savings account. Although that would allow an account holder to earn a higher interest rate and to pay lower fees at the same time, the average monthly fee charged to minimum-balance account holders who do not play by the rules is $8.879. While the charge is lower than the average cost of no-minimum-balance accounts, it is still much higher than the forgone interest.

Given the data, one can calculate what the interest on alternative investments would have to be in order to make it worthwhile to invest the minimum balance elsewhere and pay the monthly fees. To earn $8.88 per month, or $106.55 per year on a balance of $1401.49 (the average minimum on the minimum-balance accounts), the rate of interest would have to be 7.6 percent, a rate much higher than the rates currently offered on savings or money market accounts. Therefore customers without liquidity constraints are better off with minimum-balance accounts. One should realize, however, that a substantial fraction of consumers do not have sufficient funds to meet the minimum-balance requirements. Those customers typically deposit just enough money to pay their checks.

III. Restrictions on Check Return

Some evidence suggests that electronic processing of checks with truncation may reduce banks' costs (Stavins 1997).[12] Although it is not clear whether a conversion of paper check processing to electronic processing *early* in the check collection process is cost-effective, paying banks can save money by not having to handle canceled checks and mail them back to their customers.[13]

Despite potential savings, most banks still return canceled checks. The reason is that customers desire it—anecdotal evidence suggests that consumers place a high value on getting their checks back in the mail and are willing to pay for them (Abt Associates, Inc. undated). Banks are reluctant to stop returning checks for fear of losing their customers to competing institutions. Nevertheless, imposing fees on check return has become more common recently. A typical fee structure involves either a monthly fee for returning all checks or a per-item charge. The fees allow banks to

[10] If an account holder exceeds the limit, he is charged a per-item fee for each additional transaction. On average, consumers write approximately 20 checks per month. Thus the charge is imposed on the difference between the total number of checks written and the allowed limit. The charge is greater if other types of transactions are performed.

[11] Some banks charge their customers $1 per month or more for the option of receiving their canceled checks back with their monthly statements. When Bank of America introduced its charge a few years ago, one-half of their individual and small business customers chose safekeeping, while the other half chose to pay $1 per month to avoid it. A market research study conducted by Abt Associates, Inc. found that "[a] significant percentage of customers will accept not receiving their checks back (safekeeping) when offered $1.00 to $1.50 as a trade-off" (Abt Associates, Inc. undated, p. 3). The anecdotal evidence and the survey indicate that the average willingness-to-pay and the average willingness-to-accept are approximately equal. We assume that the average customer who does not receive his canceled checks back loses $1.

[12] Check truncation means that a physical check is stopped at some point during the collection process before it reaches the check writer. After that, the payment information may be processed electronically.

[13] A paying bank is the bank on which a check is drawn and the last institution handling the check before it is returned to the check writer. For a description of the check collection process, see Stavins (1997).

price discriminate by lowering their costs of serving customers who agree to safekeeping, and raising their revenues from customers whose willingness-to-pay for getting their canceled checks exceeds the charges.

Except for some anecdotal evidence and mostly qualitative market research, no information is available on consumer preferences related to check return. The data used here permit a detailed comparison between accounts where checks are returned and those where they are not, as well as of the various forms that check restrictions take. Some banks impose explicit monthly fees for accounts where checks are returned, others do not return checks at all or limit the number of checks that are returned each month. In some cases banks allow their customers to request additional checks for a fee.

The data include an indicator showing whether checks are returned under the terms of an account and the monthly fee for check return if such an option is offered, as well as an indicator showing whether another type of restriction on check return is imposed. Table 6 compares the average features for accounts with and without restrictions. Approximately 50 percent of accounts with check return restrictions charge a monthly fee to customers who choose to get their checks back, $1.77 on average. The accounts with check return constraints are more likely to carry additional cost-saving restrictions as well: 3 percent require accepting images, compared to only 0.8 percent of the no-restriction accounts; 11 percent limit teller use, compared to 2 percent of the no-restriction accounts; the average fee for using an ATM not owned by the bank (that is, a foreign ATM fee) is $1.37 compared to $1.19, and the average per-item fee is $0.16 compared to $0.11.

The above comparison suggests that the unrestricted accounts offer higher quality than the other accounts. However, the accounts with restrictions on check returns have lower requirements. On average, a lower amount is required to open an account ($96.65 vs. $227.94), a lower minimum balance has to be kept in the account to avoid monthly fees ($641.35 vs. $999.90), and a lower monthly fee is imposed if the minimum is not maintained ($6.22 vs. $7.45). The fraction of accounts with check return restrictions is higher where no minimum balance has to be maintained (55 percent vs. 29 percent).

Because banks cannot observe consumer preferences directly, they separate their depositors by offering accounts with restrictions that appeal to customers with a lower willingness-to-pay for special options, such as canceled checks, while allowing customers with a higher willingness-to-pay to pay for the same features. That type of price discrimination is called second-degree price discrimination. If sellers cannot observe consumer preferences directly, they will offer a menu of bundles to choose from. Consumers then choose the bundles that match their demand.[14]

While check safekeeping may lower costs to the paying bank, banks that offer it as an option have to be equipped to handle both ways of check processing, and must be able to respond to checkwriters' inquiries on demand. That may require additional investments in technology and staff. Because of scale economies in check processing (see Bauer and Hancock 1993), the

Table 6
Descriptive Statistics for Checking Accounts with and without Restrictions on Check Return

Checking Accounts with Restrictions on Check Return

Variable	Mean	Standard Deviation	Minimum	Maximum
ret_fee	1.774	.805	0	5
image	.030	.171	0	1
teller	.108	.311	0	1
min_open	96.655	126.305	1	1000
nsf	19.707	5.607	10	30
atm_oth	1.365	.398	.5	2
chk_ret	.491	.501	0	1
num_trans	10	8.033	0	50
translim	.263	.441	0	1
atm_own	.013	.095	0	1
min_bal	641.351	1483.284	0	10000
mo_fee	6.216	3.893	0	17
per_item	.156	.290	0	1

Checking Accounts without Restrictions on Check Return

Variable	Mean	Standard Deviation	Minimum	Maximum
image	.008	.088	0	1
teller	.020	.139	0	1
min_open	227.943	588.348	1	5000
nsf	21.311	4.687	10	30
atm_oth	1.186	.376	.4	2
num_trans	12.839	13.762	0	50
translim	.232	.423	0	1
atm_own	.013	.107	0	1
min_bal	999.902	1541.937	0	15000
mo_fee	7.450	4.079	0	25
per_item	.112	.225	0	1.5

[14] See Tirole (1989) for more details on the various types of price discrimination.

safekeeping option may not be profitable to smaller institutions.[15] Indeed, banks that offer accounts with check restrictions are, on average, the larger banks. The average bank that offers accounts with check return restrictions (safekeeping or other) has $26 billion in assets, 12,000 employees, and 313 branches. By comparison, the average bank that does not offer accounts with check return restrictions has $15 billion in assets, 6,000 employees, and 158 branches.

IV. The Effects of Checking Account Fees

Prior to January 1, 1986, ceilings were imposed on interest rates on consumer deposits. In the case of NOW accounts, the ceiling was set at 5¼ percent. Following interest rate deregulation, banks were free to raise the interest rates paid on deposits. However, interest rates on deposits proved to be somewhat sticky, with the rates offered on NOW accounts especially slow to respond to changes in market rates (Davis, Korobow, and Wenninger 1987). One possible explanation for the slow adjustment of interest rates on NOW accounts could be a lag in response to deregulation. Another plausible explanation is that banks do not increase NOW rates when other interest rates rise because the supply of NOW deposits is inelastic with respect to market interest rates. A recent study confirmed that the supply of deposits to checking accounts is inelastic with respect to interest rates.[16]

Is the Supply of Deposits Sensitive to Fees?

If the supply of deposits to checking accounts is not sensitive to the interest rates paid on deposits, what determines which account a potential depositor selects? Here we test a hypothesis that the supply of deposits is sensitive to the fees and restrictions on checking accounts.

The volume of deposits in a bank's checking accounts depends on two major factors: the overall volume of local deposits, and the bank's share in that total. The former depends on the local economic conditions. The latter depends on the number of local financial institutions where deposits can be held and on the bank's own characteristics. The more attractive the bank is to its potential depositors relative to the alternative institutions, the higher the volume of deposits. A bank's attractiveness can be measured by its checking account fees and restrictions, by the convenience of its location, and by the range of services offered. Convenience is approximated here by each bank's number of branches in the state. The more branches and ATMs a bank has, the more convenient it is to its depositors. We control for bank size by including bank assets in the regression. Although we have no direct measures of the range of services each bank offers, banks with more assets tend to offer a wider spectrum of services. Estimated coefficients on the fees and restrictions will yield information on the sensitivity of deposit supply with respect to the various features.

The supply of deposits was found to be elastic with respect to per-item fees, check return restrictions, teller restrictions, and foreign ATM fees.

Because the data are cross-sectional, local economic conditions are accounted for by including market-specific fixed effects. The following equation was estimated:

$$\ln(\text{deposits}_i) = \lambda_0 + \lambda_j x_j + \lambda_1 \ln(\text{branch}_i) + \lambda_2 \ln(\text{assets}_i) + \lambda_3 \ln(\text{fees}_i) + \omega_i \qquad (3)$$

where λ_j is fixed effect for market j, x_j is a dummy variable equal to 1 for market j, branch_i is the number of branches of bank i,[17] deposits_i and assets_i are bank i's deposits and assets, respectively, and ω_i is a random error term.

Equation (3) is a reduced-form equation. On the demand side, higher fees may discourage potential customers and reduce a bank's deposits. On the supply side, banks have certain funding needs. To meet those needs, banks may have to offer more attractive bundles of features on their deposit accounts. As a result of both factors, banks that offer more attractive

[15] Although credit unions safekeep their checks, they do not offer check return as an option and therefore do not have to maintain a dual infrastructure.

[16] Amel and Hannan (1998) estimated interest rate elasticities of supply of NOW deposits for 22 metropolitan areas. Almost none of the estimated elasticities were statistically significant, and all had low absolute values.

[17] The number of branches is also a proxy for the number of ATMs.

Table 7
Estimation of Effects of Checking Account Restrictions on Bank Deposits

ln (NOW deposits)	Coefficient	t-statistic
intercept	−2.378	−.778
ln (asset)	.561	7.798
ln (branch)	.551	6.846
ln (mo_fee)	−.115	−.601
ln (per_item)	−1.287	−2.161
restrict	−1.224	−1.547
chk_ret	.175	.242
ln (ret_fee)	1.332	1.849
teller	−1.049	−2.287
ln (nsf)	1.527	1.583
ln (atm_oth)	−1.747	−2.250
min_bal=0	.384	1.530
R^2 = .665		
F = 19.23		
N = 375		

features on their checking accounts are expected to have higher deposits.

The results of the estimation are shown in Table 7. As expected, banks with larger assets and a higher number of branches have larger deposits in their NOW accounts. Fees and restrictions on checking accounts were also found to have a strong effect on deposits. The supply of deposits was found to be sensitive to per-item fees, check return restrictions, teller restrictions, and foreign ATM fees. Specifically, a 1-percent increase in the per-item fees lowers the supply by 1.29 percent, a restriction on the use of tellers lowers the supply by 1.05 percent, and a 1-percent increase in foreign ATM fees lowers the supply by 1.75 percent.

The effect of restrictions on check return has the expected negative sign, but is not statistically significantly different from zero. The coefficient on the fee for check return is positive, contrary to expectations. The result could be driven by inertia on the side of the consumers: Because of high costs of switching banks, depositors respond to new charges with a lag. Using future surveys will enable us to test whether customers' response to the check return fee changes over time.

The coefficient on NSF (non-sufficient funds) fees is not statistically different from zero, indicating that depositors are not sensitive to high NSF fees. That explains why banks have been able to charge high NSF fees without major reaction from depositors.[18] Substantial variation occurs across markets, as reflected in the size and statistical significance of some of the coefficients on market-specific dummy variables (not shown).

As we mentioned briefly in the previous section, banks bundle fees and services to offer their accounts. In some cases it may be difficult to isolate the effects of individual characteristics if groups of features are typically bundled together. In particular, the check return fee is highly correlated with the dummy variable indicating whether there are restrictions on check return. As a result of the multicollinearity, the estimates of the coefficients on the check return fee and on the dummy variable indicating whether checks are returned with monthly statements are less precise.

The data on bank deposits are taken from the Call Reports and are not broken down by specific account. Therefore the dependent variable is the same for each account within a given bank. Some of the restrictions are also constant for each account within a bank (for example, teller restrictions and foreign ATM fees), and the supply of deposits is sensitive with respect to those variables. However, it is possible that the estimated effects of other fees on deposit supply would be different if data on deposits in each type of account were used. Estimating equation (3) using average fees for each bank (instead of individual account-level data) yielded coefficients that were qualitatively similar to those shown in Table 7.

Do Checking Account Fees Increase Revenues?

Some checking account fees are designed to induce consumers to use less expensive technologies, such as the fees for the return of canceled checks or for the use of live tellers. They also allow financial institutions to price discriminate by generating revenues from consumers whose demand is relatively less sensitive with respect to particular charges. For example, by introducing a fee for returning canceled checks with a monthly statement, banks can get revenues from a service that was previously free. In pricing the various options, banks have to take into account their local market structure and customers' sensitivity of demand, in order to avoid losing revenue.

For a given supply of deposits and given consumer behavior, higher fees are bound to lead to

[18] A recent article suggests that some bank customers have started reacting to the NSF fees (Rick Brooks, "How Banks Make the Most of Bounced Checks," *Wall Street Journal*, 2/25/99).

higher revenues. If consumers are sensitive to the additional charges, however, they will either transfer their deposits to other institutions or modify their behavior to lower their costs. The second option may include raising the minimum balance kept in an account or giving up the receipt of canceled checks. Depending on the consumer sensitivity with respect to the fees, a bank's revenues could increase or decrease. We estimate the following equation:

$$\ln(\text{revenues}_i) = \alpha_0 + \alpha_j x_j + \alpha_1 \ln(\text{deposits}_i) + \alpha_2 \ln(\text{fees}_i) + \varepsilon_i \qquad (4)$$

where revenues_i are bank i's revenues from its checking account fees, α_j are market-specific fixed effects, deposits_i are bank i's checking account deposits, fees_i is a vector of checking account fees at bank i, and ε_i is a random error term.

After allowing for the direct effects of fees and for their negative effects on deposits, only higher fees on check return and higher NSF fees are associated with higher check fee revenues.

Equation (4) was estimated with two-stage least squares (2SLS) estimation, taking into account the relationship between deposits and bank attributes (assets, number of branches, and checking account fees; see equation (3)). The results are presented in Table 8. Deposits in NOW accounts were used in the regression, although the results were similar when other types of deposits were used.[19]

The estimated coefficients on most of the checking account fees are positive and statistically significant, indicating that banks that charge higher service fees on their accounts have higher check fee revenues. Compared to the rest of the sample and holding all the other features constant, a bank with a 1-percent higher per-item fee has check fee revenues that are 1.05 percent higher; a bank with a 1-percent higher NSF fee has check fee revenues that are 1.97 percent higher; a bank with a 1-percent higher foreign ATM fee has check fee revenues that are 1.7 percent higher; and a bank that restricts the use of tellers has check fee revenues 0.8 percent higher. Thus, higher NSF and foreign ATM fees raise banks' revenues the most. The coefficient on the check return fee was negative but not statistically significantly different from zero.

Table 8
Estimation of Direct Effects of Checking Account Fees on Bank Check Fee Revenues

log(revenues)	Coefficient	t
intercept	−11.166	−5.169
ln (NOW deposits)	1.123	28.391
interest	−.060	−.383
ln (mo_fee)	−.053	−.360
ln (per_item)	1.055	2.375
ln (ret_fee)	−.195	−1.129
teller	.803	2.305
ln (nsf)	1.965	2.780
ln (atm_oth)	1.699	3.274
min_bal=0	−.154	−.791
R^2 = .829		
F = 50.13		
N = 375		

However, the estimated coefficients reflect the direct effects of the fees on banks' revenues. In addition to the direct effects, the fees affect the revenues indirectly through their negative effects on deposits. To calculate the total effect of fees on bank revenues, one has to take both factors into account as follows:

$$\frac{\partial \ln(\text{revenues})}{\partial \ln(\text{fees})} = \alpha_2 + \alpha_1 \frac{\partial \ln(\text{deposits})}{\partial \ln(\text{fees})} = \alpha_2 + \alpha_1 \lambda_3 \qquad (5)$$

After the above transformation, only higher fees on check return and higher NSF fees are associated with higher check fee revenues. A bank with a 1-percent higher check return fee has revenues that are 1.3 percent higher, while a bank with a 1-percent higher NSF fee has revenues that are 3.68 percent higher than the rest of the sample, again holding all other factors constant. The other fees seem to deter bank customers and induce them to deposit their money elsewhere. As a result, banks have fewer accounts on which they can assess fees, leading to lower revenues.

[19] Other specifications included total deposits, transaction account deposits, and deposits broken down by the size of assets (accounts below $100,000 and accounts over $100,000).

V. Summary and Conclusions

Recent evidence shows that the supply of deposits to checking accounts is not elastic with respect to the interest rates paid on the accounts. That suggests that the various features attached to checking accounts may be more important than interest rates in determining the supply of deposits and banks' revenues from the fees. This study uses a national survey of checking accounts offered by financial institutions in 25 major metropolitan areas in the United States to analyze the effect of restrictions and fees imposed on checking account holders on the supply of deposits and on the banks' revenues. Particular emphasis is placed on relatively new restrictions that are designed to induce customers to adopt cost-saving behavior, such as restrictions on the return of canceled checks and on the use of live tellers.

The results show that the supply of deposits to checking accounts is sensitive with respect to the bank's per-item fees, check return restrictions, teller restrictions, and foreign ATM fees. Because of this sensitivity of deposit supply, raising those fees was found to *lower* bank revenues from servicing the checking accounts. Only the fee on check return and the NSF fee were found to significantly raise bank checking account revenues. Future research will extend the analysis to use panel data based on repeated surveys. By utilizing panel data, we will be able to estimate the effect of changes in fees on changes in deposits and revenues, therefore controlling for any possible bank-level fixed effects.

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