

The Return Banks Have Paid on NOW Accounts

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INTRODUCTION

Since their nationwide introduction on December 31, 1980, NOW accounts have become a popular alternative to personal checking accounts and small savings accounts.¹ This is not surprising,

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¹According to the Fed's Demand Deposit Ownership Survey, consumers held roughly \$88.2 billion in demand deposits (regular checking accounts) in December 1982. For the same month, other checkable deposits, which are primarily NOW accounts, stood at \$104 billion.

since NOWs are a hybrid of checking and savings accounts: they offer households an account against which they can write checks while earning interest on their average balances. But how much are depository institutions actually paying on NOW accounts? And how does this rate compare with the rates these institutions pay on the personal checking and regular savings accounts that NOWs seem to be replacing?

The interest rates banks explicitly promise to pay on these accounts are easy enough to compare. Most institutions offer, as the ads say, the "maximum rate allowed by law." And currently regulatory ceilings allow banks and thrifts to offer up to 5½ percent on savings accounts, 5¼ percent on NOW

accounts, and 0 percent on regular checking accounts. But in addition to explicit interest, banks often pay their depositors what is called "implicit interest," by offering them various goods and services at below cost. If we take implicit interest into account, comparing rates of return becomes more difficult because implicit interest is more difficult to measure.

One of the most popular techniques for estimating the implicit interest banks pay on customer deposits uses data from the Functional Cost Analysis (FCA), a detailed survey of banks' expenses and revenues compiled each year by the Federal Reserve (Fed).² FCA data allow us to construct estimates of both the explicit and the implicit interest rate that banks have been paying on checking accounts, savings accounts, and NOW accounts. The FCA-based estimates suggest that the average total return did not differ that greatly among the three accounts in 1981 and 1982, the first two years of the nationwide NOW experience. These estimates also indicate how decisions by both banks and households figure into the implicit interest rate actually paid on the different types of deposits.

THE RETURN BANKS PAY ON DEPOSITS

For over 50 years, regulatory ceilings have limited the explicit interest rates that commercial banks and thrift institutions could offer on various kinds of deposits. The Banking Act of 1933 prohibited commercial banks from paying any explicit interest at all on demand deposits. That Act also established Regulation Q under which the Fed set legal ceilings

on the explicit interest rates commercial banks could pay on time and saving deposits. In 1966, similar ceilings were imposed on thrift institutions. Regulation Q interest rate ceilings have been raised only modestly over the last fifteen years. For example, in 1966 commercial banks were permitted to pay up to 4 percent interest on savings accounts and thrift institutions up to 4½ percent. When the ceilings were last raised in early 1984, commercial banks and thrifts were permitted to offer up to 5½ percent on savings accounts. When NOW accounts first were authorized in New England in 1972, depository institutions could offer up to a 5 percent explicit interest rate on them. When NOWs went nationwide in December 1980, the interest rate ceiling was raised to 5¼ percent.³

The long-standing prohibition against paying explicit interest on demand deposits and, more recently, the relatively low Regulation Q ceilings on explicit interest rates for regular savings accounts have forced banks to rely on implicit interest to attract these kinds of deposits. The implicit interest a bank offers its household customers may take a variety of forms. Offers of free household items—toasters, blankets, dishes—are perhaps the most obvious. But more routinely a bank pays implicit interest by offering its customers the product in which it specializes—financial services—at a price below the bank's cost of producing those services. Both checking and savings accounts offer banks opportunities to pay implicit interest in this way.

²A comprehensive study of the implicit interest paid on demand deposits based on the Functional Cost Analysis data through 1976 is in Richard Startz, "Implicit Interest on Demand Deposits," *Journal of Monetary Economics* 5 (1979), pp. 515-534. Notable studies taking alternative approaches to estimating implicit interest on demand deposits are by Robert J. Barro and Anthony Santomero, "Household Money Holdings and the Demand Deposit Rate," *Journal of Money Credit and Banking* (May 1972), pp. 397-413, which uses survey data collected by the authors, and Benjamin Klein, "Competitive Interest Payments on Bank Deposits and the Long Run Demand of Money," *American Economic Review* 64, (December 1974), pp. 931-949, which assumes that banks always pay a competitive rate. A useful discussion and summary of work in this area is in Michael Klein, "The Implicit Deposit Rate Concept: Issues and Applications" Federal Reserve Bank of Richmond *Economic Review*, 64 (Sept./Oct. 1978), pp. 3-12.

³NOWs first were issued in 1972 by mutual savings banks in Massachusetts and New Hampshire as an attempt to compete more effectively with commercial banks for households' deposits. The new accounts were not particularly popular at first, but gradually they caught on, and by 1980 the authority to issue NOWs had been extended to commercial banks and thrift institutions in all the New England states, New York, and New Jersey. Then, in December 1980, as a step toward the removal of the Regulation Q interest rate ceilings as mandated by the Monetary Control Act, all commercial banks and thrifts in the nation were given permission to offer NOW accounts. For further details, see the Federal Reserve Bank of Boston's *The NOW Account Experience in New England*, (1981), which includes relevant articles originally published in various issues of their *New England Economic Review*. For an overall analysis of the early New England NOW account experience, see Joanna H. Frodin and Richard Startz, "The NOW Account Experiment and the Demand for Money," *Journal of Banking and Finance* 6 (1982), pp. 179-193.

A household maintains a checking account with a bank because of the transactions services associated with it. The checking account provides a safe way to collect and store the funds that the household receives in various transactions, and a quick and convenient way to use the funds in additional transactions when the household decides to purchase either goods and services or other financial assets. Providing these transactions services is not costless; banks must devote real resources to accepting deposits, processing and clearing checks, handling currency, maintaining account records, and so forth. A bank can pay implicit interest to its checking account customers by providing these transactions services without charging them the full cost of the requisite resources. The bank may, for example, give customers free checks; it may set per check charges below the costs of processing and clearing a check; it may mail out monthly statements and cancelled checks without charge; it may accept deposits and allow cash withdrawals without charge; it even may make such transactions less time-consuming for the customer by providing more neighborhood branches and extra teller windows.

Regular savings accounts are not “checkable”—that is, the account holder cannot write checks transferring ownership of some portion of the funds in the account to a third party—so these accounts cannot be used to make purchases directly. Still, a savings account offers the depositor a relatively convenient asset in which any amount of funds, large or small, can be stored safely, and from which any portion of the funds, large or small, can be withdrawn quickly. As with checking accounts, banks use up real resources to produce the conveniences associated with savings accounts. And, likewise, banks have at least some opportunity to pay implicit interest on savings accounts by providing services at below cost.

NOW accounts are checkable, so banks can offer households the same implicit interest on NOWs as on regular checking accounts. But banks also may pay nearly the same explicit interest rate on NOWs as on regular savings accounts. Did banks wind up offering NOW account holders the best of both worlds: the same implicit interest as on regular checking accounts plus the maximum allowable explicit interest rate? Or did banks offer NOW account holders less implicit interest than

on regular checking in exchange for an explicit interest rate closer to that on regular savings? These are the questions we put to the Functional Cost Analysis data.⁴

MEASURING RATES OF RETURN ON HOUSEHOLDS' DEPOSITS FROM THE FCA DATA

Functional Cost Analysis is a voluntary program developed by the Fed to help banks assess the performance and profitability of their various operations. Each year, the participating banks fill out a standardized set of reports detailing the expenses they have incurred and the revenues they have generated in performing specified functions. These functions correspond to various asset and liability categories on the banks' balance sheets. On the liabilities side, banks are asked to estimate annual costs and revenues associated with providing demand deposits and savings deposits to their customers. Within these two classifications, banks may break down their costs and revenues into those associated with personal checking accounts, regular savings accounts, and NOW accounts, among others.⁵ The expenses on these accounts are divided into what are called “interest” and “non-interest” expenses, so the FCA data can be used to estimate the average explicit and implicit return banks pay on these accounts.

Estimating the average explicit interest rate banks paid on a particular type of account is straightforward. Banks' average interest expense per account is divided by the average outstanding balance per account.

Estimating the average implicit rate banks pay

⁴Generally, we would not expect depositors to view explicit interest and implicit interest as equally desirable. In principle, depositors would tend to prefer explicit interest payments—which they can use to purchase whatever set of goods and services they choose—over implicit interest payments—which they must consume in the form of the financial services or promotional products offered. But income tax considerations tend to favor implicit interest payments—which are not taxed—over explicit interest payments—which are taxed.

⁵Banks cannot break down all of their expenses precisely among the various types of accounts. They may allocate some of their overall deposit expense to a particular type of account on the basis of its proportion of total deposits or of total transactions, or on the basis of a survey of typical account activity. When a reporting bank does not allocate all of its costs, the FCA program does so according to historical and average bank patterns.

on a particular type of account requires two steps. First, take average "non-interest," or operating, expense banks incurred per account, and subtract the average revenue banks received in service charges per account. This difference measures the average implicit interest payment banks made per account. Second, divide this implicit interest payment by the average account balance to obtain the average implicit interest rate banks paid. So, for each type of account, the average implicit rate is measured as:

$$\text{Implicit Interest Rate} = \frac{\left(\frac{\text{Non-Interest Expense per Account}}{\text{Average Balance per Account}} \right) - \left(\frac{\text{Customer Charges per Account}}{\text{Average Balance per Account}} \right)}{1}$$

The sum of the average explicit interest rate and implicit interest rate on each type of account represents the estimated total return on that type of account.

Comparing Total Returns. Available FCA data allow us to estimate the average rates of return on NOW accounts, regular checking accounts, and regular savings accounts from 1976 to 1982. The estimates, shown in Table 1, suggest that the explicit interest rate ceilings on these accounts have not been good indicators of their total rates of return.

The total return on NOW accounts has been relatively stable at about 7 percent over the sample period. Each year, this roughly 7 percent return on NOWs has been comprised of an average explicit interest rate near the 5 percent to 5¼ percent regulatory ceiling and an implicit interest rate within a few basis points of 2 percent.

The total return on households' regular checking accounts has persistently fallen below that on NOW accounts, but the difference between the two rates has been far less than the 5 percent to 5¼ percent advantage NOWs have in allowable explicit interest. In fact, in 1981 and 1982, the first two years that NOWs were authorized nationwide, the spread between the total returns on the two accounts narrowed to less than 1 percentage point. So banks have been paying an implicit interest rate on regular checking accounts nearly 4¼ percentage points higher than the implicit rate on NOWs.

The total return on regular savings accounts has risen steadily from about 6 percent, roughly 1

percentage point below the average NOW account rate, in 1976, to about 8 percent, roughly 1 percentage point over the average rate on NOWs, in 1982. As with NOWs, the average explicit interest rate on regular savings accounts has remained close to the Regulation Q ceiling rate. The difference in total rates of return has been the steadily rising implicit interest rate on regular savings accounts, which contrasts with the relatively flat performance of the implicit interest rate on NOWs.

The FCA data suggest that since NOWs have gone nationwide their total rate of return has not differed substantially from the rates paid on regular checking and regular savings accounts. In fact, during 1981 and 1982, the average rate of return on NOWs was just about halfway between the average rates of return on the two older types of accounts. But the FCA estimates also raise some interesting questions. How did banks manage to pay such a high implicit interest rate on regular checking accounts and such a low implicit rate on NOWs when both are checkable type deposits? And how did banks come to pay a higher implicit rate on regular savings accounts than on NOW accounts when savings accounts are not checkable? To help answer these questions it is useful to look at what determines the average implicit interest rates on these accounts: banks' average expenses per account, banks' average customer service charges per account, and customers' average balances per account.

COMPARING IMPLICIT RATES ON NOWs AND REGULAR CHECKING ACCOUNTS

Since the implicit rate on NOWs is so much lower than that on households' regular checking, it is tempting to conclude that NOW account holders have treated NOWs more like savings accounts than checking accounts, and so have used fewer transactions services than regular checking account holders. Or perhaps one might conclude that since banks are paying some explicit interest on NOWs, they have taken back some implicit interest by raising service charges to NOW account customers. But the FCA data support neither of these conclusions. First, NOW account customers have not, in fact, used appreciably fewer transactions services than regular checking account customers. It is true that banks' average expenses per NOW account (Table 2) have been

TABLE 1
AVERAGE RATES OF RETURN
ON HOUSEHOLD DEPOSITS
AT COMMERCIAL BANKS^a

Year	NOW Accounts			Regular Checking Accounts ^b			Regular Savings Accounts		
	Total Return	Explicit Interest Rate	Implicit Interest Rate	Total Return	Explicit Interest Rate	Implicit Interest Rate	Total Return	Explicit Interest Rate	Implicit Interest Rate
1976	6.77%	4.89%	1.88%	5.37%	0%	5.37%	5.93%	4.79%	1.14%
1977	6.67	4.78	1.89	5.47	0	5.47	5.89	4.80	1.09
1978	6.87	4.84	2.03	4.82	0	4.82	6.12	4.85	1.28
1979	7.03	4.91	2.12	4.88	0	4.88	6.50	5.02	1.48
1980	6.78	4.92	1.86	4.61	0	4.61	7.09	5.13	1.95
1981	6.98	5.14	1.84	6.41	0	6.41	7.65	5.18	2.47
1982	7.11	5.21	1.90	6.35	0	6.35	8.04	5.17	2.86

^aFCA reports average expenses, revenues, and balances data for small banks, medium size banks, and large banks separately. The published data were aggregated to compute the overall average figures presented here. See Appendix for details.

^bEstimation of the implicit interest on households' non-interest-bearing checking accounts is complicated by the fact that banks report the personal checking account data for interest-bearing and non-interest bearing accounts combined. The estimates presented here are based on the assumption that the characteristics of the average interest-bearing account at the banks reporting personal checking account data are identical to those of the average NOW account at banks reporting NOW account data. See Appendix for details.

lower than their average expenses per regular checking account (Table 3) in each year of our sample, but the difference has been relatively small. So it seems that the average NOW account is nearly as active as the average checking account and uses up nearly as much in bank resources.⁶

Second, banks have not, in fact, imposed higher service charges on NOW account customers than on regular checking account customers. Just the opposite is true. On average, banks have been imposing higher service charges on regular checking accounts than on NOW accounts. Furthermore,

⁶Persistent increases in average expense per account, both for regular checking and for NOWs, suggest households have been increasing their usage of checkable account services. Various measures of account activity, such as the average

number of checks drawn per account and average number of deposits per account, published as part of the FCA data, confirm this pattern.

TABLE 2

**IMPLICIT INTEREST PAID ON
NOW ACCOUNTS
AT COMMERCIAL BANKS**

Year	Non-Interest Expense per Account	Customer Charges per Account	Implicit Interest Payment per Account	Average Balance per Account	Implicit Interest Rate
1976	\$ 53.47	\$ 3.78	\$49.69	\$2637.20	1.88%
1977	53.36	5.80	47.56	2521.84	1.89
1978	59.88	4.82	55.06	2713.15	2.03
1979	72.04	10.16	61.88	2920.02	2.12
1980	77.21	8.86	68.35	3682.38	1.86
1981	86.87	7.68	79.20	4300.85	1.84
1982	106.34	10.90	95.44	5029.83	1.90

NOTE: See the Appendix for details of data and calculations.

these higher service charges more than compensate for the slightly higher expense banks incur on the regular checking accounts. In six of the seven sample years, the implicit interest payment banks made on the average household's regular checking account was lower than the implicit interest payment they made on the average NOW account. And the gap between the two implicit interest payments has been widening, because banks have persistently increased the service charges on regular checking, while keeping the customer charges on NOW accounts relatively low.

Despite making lower implicit payments on households' regular checking accounts, banks have paid a higher average implicit interest rate on these accounts than on NOWs simply because the average balance the checking account holders maintain is so much lower than the average balance the NOW account holders maintain. Over our

seven-year sample the outstanding balance in the average NOW account roughly doubled, growing from about \$2,500 per account in 1976 and 1977 to \$5,000 per account by 1982. As a result, the approximate doubling in the average implicit interest payment on NOWs, from just under \$50 in 1976 to just under \$100 in 1982, has simply kept the implicit rate on NOWs constant at about 2 percent. Meanwhile, the average balance in a household's regular checking account has shown little sustained growth, fluctuating only modestly around its \$1,050 per account average. So, even though the implicit interest payments on households' regular checking account balances have grown only half as fast as those on NOW account balances over the seven-year period, the implicit interest rate on regular checking has been relatively high and recently has been rising.

Average balances make the difference. The

TABLE 3
**IMPLICIT INTEREST PAID ON
 INTEREST-BEARING
 PERSONAL CHECKING ACCOUNTS
 AT COMMERCIAL BANKS**

Year	Non-Interest Expense per Account	Customer Charges per Account	Implicit Interest Payment per Account	Average Balance per Account	Implicit Interest Rate
1976	\$ 61.50	\$13.11	\$48.39	\$ 901.18	5.37%
1977	66.05	16.07	49.99	914.28	5.47
1978	65.66	17.19	48.47	1005.03	4.82
1979	75.04	18.98	56.06	1149.23	4.88
1980	79.30	23.61	55.69	1206.85	4.61
1981	100.13	33.26	66.87	1043.39	6.41
1982	107.12	35.53	71.59	1127.93	6.35

NOTE: See the Appendix for details of data and calculations.

wide disparity in average balances between households' regular checking accounts and NOW accounts may reflect a number of factors, but at least in part it points up an important distinction between explicit and implicit interest.⁷ When a bank offers its customers explicit interest it is giving them an incentive to maintain larger account balances, because the amount of interest the bank pays them depends on the amount of funds they keep in their account. If a bank offers its customers 5 percent interest on their NOW accounts,

then every time a customer adds a dollar to his average balance for the year, he earns an additional \$.05 interest. But when a bank offers to pay its customers implicit interest, it creates no incentive for them to maintain large accounts, because the amount of interest the bank pays them depends on how much they use their account, not on the amount they keep in it. If a bank pays its customers implicit interest by offering them free checking, then the customer does not get any more interest when he adds a dollar to his account; he gets more interest when he writes another check. So holders

⁷Depository institutions can influence the average balances held in accounts of a certain type by setting minimum average balance requirements for free or reduced price services. The FCA data provide no direct information on minimum balance requirements at participating institutions. "The Maturing of the NOW Account in New England," by Ralph C. Kimball, which is

reproduced in *The NOW Account Experience In New England*, provides some data which strongly indicate that minimum average balance requirements on NOWs raise the average account size, but the magnitude of this effect is difficult to assess.

of regular checking accounts, which pay only implicit interest, have no incentive to hold any more than the bare minimum needed for transactions in their accounts. But holders of NOW accounts, which pay explicit as well as implicit interest, have the incentive to hold higher average balances.

Banks' realization that the average balances in households' regular checking accounts have tended to stagnate at a relatively low level may lie behind their decision to impose heavier and heavier service charges on these accounts, as we observe banks doing over the last several years of our sample. Given the increasing average cost of providing services on these accounts, banks seem to have raised customer charges in order to limit the implicit rate of interest they wind up paying on households' regular checking accounts.

COMPARING THE IMPLICIT RATE ON NOW ACCOUNTS AND REGULAR SAVINGS ACCOUNTS

Households' decisions about how much to hold

in various deposit accounts also explain our seemingly paradoxical finding that recently banks have been paying a higher implicit rate on regular savings accounts, which are not checkable, than on NOW accounts, which are checkable.

We would expect that it costs banks less to provide the services associated with regular savings accounts than to provide those associated with regular checking accounts and NOW accounts. The FCA data bear this out: banks' non-interest expenses on regular savings accounts (Table 4) average less than half those on checkable accounts. Nonetheless, banks' average expenses per regular savings account have been rising, particularly in the last three years of the sample, reflecting more active account usage by customers. In fact, as with the checkable accounts, banks' expenses per savings account have roughly doubled over the sample period. Meanwhile banks have kept the average service charges on regular savings accounts at negligible levels. So, as with NOW accounts,

TABLE 4

**IMPLICIT INTEREST PAID ON
REGULAR SAVINGS ACCOUNTS
AT COMMERCIAL BANKS**

Year	Non-Interest Expense per Account	Customer Charges per Account	Implicit Interest Payment per Account	Average Balance per Account	Implicit Interest Rate
1976	\$21.57	\$.00	\$21.57	\$1885.20	1.14%
1977	22.51	.00	22.51	2068.13	1.09
1978	26.73	.00	26.73	2096.78	1.28
1979	26.73	.24	26.49	1793.16	1.48
1980	30.74	.37	30.36	1555.47	1.95
1981	37.24	.74	36.50	1480.53	2.47
1982	42.61	.73	41.89	1462.71	2.86

NOTE: See the Appendix for details of data and calculations.

banks have passed nearly all of the value of the increased financial services on regular savings accounts through to their customers as increased implicit interest payments. The reason that the implicit rate of interest on regular savings accounts has been rising, while that on NOWs has remained flat, is the difference in average balances. While NOW account holders have roughly doubled their average account balance over our sample period, regular savings account holders have been reducing their average balance. Between 1978 and 1982, average balances in regular savings accounts fell by 30 percent from nearly \$2,100 to just under \$1,500.

The declining average balances in regular savings accounts between 1978 and 1982 probably reflect the impact of rising market interest rates on households' decisions about how to allocate their savings. Rising average expenses per regular savings account may reflect the same influences. Market rates above the ceiling interest rate offered on regular savings deposits tended to draw off the deposits of households who had enough funds to meet the minimum dollar requirements on instruments bearing market interest rates and were willing to forgo the greater liquidity offered by regular savings deposits. So the savings accounts which remained tended to be those with smaller average balances and those whose holders took greater advantage of the financial services that savings accounts offer. The combination of smaller average balances and larger average expenses per account worked to raise the average implicit rate of return on regular savings accounts.

CONCLUSION

Since December 31, 1980, commercial banks and thrift institutions across the country have been permitted to offer NOW accounts to their household depositors. An analysis of the FCA data on commercial banks' expenses suggests that since that time banks have paid NOW account customers a total rate of return close to the total

rate of return paid on regular checking and on regular savings accounts. NOW account holders are receiving close to the maximum allowable explicit interest rate but a lower implicit interest rate than on regular checking accounts. In fact, the data indicate that the breakdown between explicit and implicit interest in NOWs' total rate of return is close to the breakdown between explicit and implicit interest in the total return on savings accounts. But it would be a mistake to infer from these results that households have been treating NOWs as savings accounts, or that banks decided unilaterally to pay a much lower implicit rate on NOWs than on regular checking. The numbers behind our implicit interest rate estimates tell a different story.

The implicit interest rate banks wind up paying on a particular type of account depends on the interaction between banks and their depositors. In particular, the rate depends on the amount of financial services that banks offer and account holders use, the charges banks impose on their customers for those services, and the average balances the account holders maintain. FCA data on banks' non-interest expenses and customer charges indicate that during 1981 and 1982, the average NOW account customer used roughly the same amount of financial services as the average household with a regular checking account. And since NOW account customers paid less for those services, they actually received larger implicit interest payments than the regular checking account holders. Holders of regular savings accounts received fewer financial services than holders of either NOWs or regular checking accounts. Yet the implicit rate paid on NOW accounts was far below the implicit rate paid on regular checking and even a bit below the implicit rate paid on regular savings. Why? The explanation lies with differences in average balances: Households have held much larger average balances in NOW accounts than in regular checking or savings accounts.

APPENDIX

Banks participating in the FCA program may report figures for a number of deposit categories. The categories used here were NOW accounts (referred to in some FCA tables as "Interest Bearing Checking Accounts" since banks may also include other checking accounts on which they pay interest), personal checking accounts (which include both interest-bearing and non-interest-bearing checking accounts owned by households and individuals), and regular savings accounts. When a bank chooses to report on a particular type of account, it indicates the number of such accounts it had outstanding and the total deposits held in them, its total interest expense and total non-interest expense on the accounts, and its total customer charges on the accounts. Based on this data, the FCA program publishes, for each type of account, the average figures of participating banks in three size classifications: small banks (less than \$50 in deposits), medium-size banks (deposits between \$50 and \$200 million), and large banks (over \$200 million in deposits).

In order to obtain the average estimates for all participating banks reported here, a weighted average of the figures for banks in the three size categories was taken, using the number of banks in each category to construct the weights. Then, for each type of account, the estimates of the average banks' total deposits, total interest and non-interest expenses, and total customer charges were divided by our estimate of the number of accounts held at the average bank in order to obtain estimates of the average account size, and the average interest expense, non-interest expense, and customer charges per account.

One additional difficulty in using the FCA data is that personal checking accounts include both the interest-bearing and the non-interest-bearing types. So the reported personal checking data on total deposits, the number of accounts, non-interest expense and customer charges (denoted D_{PC} , N_{PC} , X_{PC} and C_{PC} below) contain an interest bearing and non-interest bearing account components:

$$(1) D_{PC} = D_{IPC} + D_{NPC}$$

$$(2) N_{PC} = N_{IPC} + N_{NPC}$$

$$(3) X_{PC} = X_{IPC} + X_{NPC}$$

$$(4) C_{PC} = C_{IPC} + C_{NPC}$$

Banks' total interest expense on personal checking accounts (I_{PC}), of course, stems only from the interest-bearing type:

$$(5) I_{PC} = I_{IPC}$$

In order to isolate the figures for the non-interest-bearing personal checking accounts (D_{NPC} , N_{NPC} , X_{NPC} and C_{NPC}) estimates of the interest-bearing components of the personal checking figures (D_{IPC} , N_{IPC} , X_{IPC} and C_{IPC}) were constructed. This was done by assuming that the interest-bearing personal checking accounts held at banks reporting personal checking account data had exactly the same characteristics as the NOW accounts held at banks reporting NOW account data.

First, it was assumed that interest-bearing personal checking accounts paid the same explicit interest rate as NOWs at FCA reporting banks, denoted i_{NOW} below. Under this assumption the explicit interest paid on personal checking simply represents the interest rate on NOWs times outstanding balances in interest-bearing personal checking:

$$(6) I_{PC} = i_{NOW} \cdot D_{IPC}$$

Equation (6) can be rearranged to produce an estimate of interest-bearing personal checking deposits:

$$(6') D_{IPC} = (I_{PC} / i_{NOW})$$

Next, we assume that the average balance held in an interest-bearing personal checking account is the same as the average balance held in a NOW account at FCA-reporting banks, denoted a_{NOW} below. Since total

interest-bearing personal checking deposits can be written as the number of these accounts times the average balance per account, we have:

$$(7) \quad D_{IPC} = a_{NOW} \cdot N_{IPC}$$

Equation (7) can be rearranged, and combined with (6') to produce an estimate of the number of interest-bearing personal checking accounts:

$$(7') \quad N_{IPC} = D_{IPC} / a_{NOW} = (I_{PC} / i_{NOW} \cdot a_{NOW})$$

Finally, we assume that per account bank expenses and customer charges on interest-bearing personal checking accounts are the same as per account expenses and charges on NOW accounts (denoted x_{NOW} and c_{NOW} respectively). Then we can total expenses and customer charges on interest-bearing personal checking, using (7'), as:

$$(8) \quad X_{IPC} = x_{NOW} \cdot N_{IPC} = (x_{NOW} \cdot I_{PC} / i_{NOW} \cdot a_{NOW})$$

$$(9) \quad C_{IPC} = c_{NOW} \cdot N_{IPC} = (c_{NOW} \cdot I_{PC} / i_{NOW} \cdot a_{NOW})$$

In short, the estimates of total deposits, the number of accounts, the total expenses, and the customer charges associated with interest-bearing personal checking are given by equations (6'), (7'), (8) and (9) respectively. These estimates are then subtracted from the total personal checking figures to obtain estimates of non-interest-bearing personal checking deposits, the number of these accounts, and the total expenses and customer charges associated with them. From these estimates the implicit interest on regular checking accounts in the text is computed.



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