

AN EXAMINATION OF IMPLICIT INTEREST RATES ON DEMAND DEPOSITS

Michael Dotsey

I. INTRODUCTION

This article focuses on various ways that the implicit rate on demand deposits can be measured, and the effects of using these implicit rates in analyzing the demand for money. The presence of implicit payments on demand deposits is a likely result of the competitive nature of the banking system. Deposits are a primary source of funds that banks can use to earn a market rate of return. Competitive pressures should force banks to offer depositors something in return for the use of transactions balances. Since the payment of explicit interest on transactions accounts was forbidden until the introduction of NOW accounts in 1973, and was regulated prior to the advent of "Super NOW" accounts in 1983, banks were forced to compete for all transactions balances in a nonprice manner. This type of competition continues to occur with respect to demand deposits and smaller NOW accounts. Some ways that this can be done is by remitting service charges, providing cash management services at subsidized rates, and giving preferential treatment on loans to depositors.

Since the competition for deposits by the banking system is likely to result in some form of implicit payment, it is important to incorporate this behavior when studying the demand for money. Omitting the implicit return on demand deposits in a money demand equation is likely to result in misspecification, therefore biasing at least some of the estimated coefficients. Potentially, this bias could be serious enough to substantially affect the ability of the equation to predict future money demand. This could lead to the unwarranted conclusion that the demand for money is unstable and that the Federal Reserve should accommodate shifts in the money demand curve when in fact no shifts have taken place.

Another related area where knowledge of implicit interest payments is of importance is in understanding the effects of deregulation in the banking indus-

try. The relative desirability and growth of new types of accounts, such as "Super NOWs," will depend on the advantages they have over existing accounts. This will involve a comparison between the current implicit payments made on demand deposits and the explicit (as well as any implicit) payments accompanying the new accounts.

In order to analyze implicit interest rates and their effects on money demand, three different estimates of the implicit rates on demand deposits are examined. Specifically, the studies of Startz [12], Barro and Santomero [1], and Klein [8] are reviewed. Each of these articles provides very different methods of arriving at an estimate of implicit rates. Startz uses accounting data to calculate a measure of services remitted, while Barro and Santomero use a private survey to derive a marginal rate of remittance. Klein, on the other hand, assumes that banks costlessly evade regulations and pay a competitive rate. Given the differences in methodology, it is not surprising that the actual estimates differ. However, all three estimates are highly correlated and show movements in the same direction. One may, therefore, have more confidence in the way in which implicit rates have changed than in their actual level.

An analysis of the effects of implicit interest rates on the demand for money is also presented. The rate derived by Barro and Santomero performs especially well. The competitive rate calculated by Klein also seems useful although there exist econometric problems in interpreting its effect.

The paper proceeds as follows. Section II discusses the derivation of each of the three implicit rates and indicates some of the problems with each construction. Section III compares the time series properties of the various rates while section IV discusses the use of implicit rates in studying the demand for money. Section V contains a brief conclusion.

II.

THE CONSTRUCTION OF IMPLICIT INTEREST RATES ON DEMAND DEPOSITS

Startz's Method: The Use of Accounting Data¹

In an interesting piece of research Startz constructs two basic measures of the implicit rate on demand deposits. One uses Functional Cost Analysis data, while the other uses the reports of income and condition of all insured commercial banks. It is the latter that will be reviewed here.²

Specifically, Startz's measure of implicit interest is composed of those expenses incurred in maintaining a deposit account that are not charged to the customer. Since banks are involved in joint production, it is difficult to allocate expenses in an unambiguous manner. To overcome this problem it is assumed that all noninterest expenses are linearly allocated to demand deposits, time deposits, and loans. Further, each activity is assumed to be independent. Expenses are then allocated by the use of a linear regression of net expenses on demand deposits, time deposits, loans, and a constant, where the coefficient on demand deposits has the interpretation of an implicit rate.³ The regression is depicted by equation (1)

$$(1) \text{ NETX} = c_0 + r_a \text{DD} + c_T \text{T} + c_L \text{L} + e$$

where NETX are total bank expenses net of service charges, DD are demand deposits, T are time deposits, L are loans, and e is a stochastic error term. The regression is run on a combined time series/cross section data set for each of the fifty states and the District of Columbia over the years 1973, 1974, and 1975. The coefficients on time deposits and loans are constrained to be constant (a constraint that can not be statistically rejected).

Even though this constraint can not be rejected over the period 1973-75, it seems unlikely that C_T would be constant over the sample period 1954-68. This is because interest rate ceilings that were imposed on time and savings accounts in 1966 were binding over most of the 1973-74 period. Therefore,

¹For another excellent example, see Becker [2].

²The method using Functional Cost Analysis data was not examined because over time the data are somewhat incompatible due to changes in the sample of banks participating in the survey, and changes in the way that indirect expenses are allocated.

³For a more detailed breakdown of net expenses, see the appendix to Startz [12].

these deposits may have been subject to some implicit payment as well. This would make C_T higher than when interest rate ceilings were nonbinding or non-existent and consequently would bias the estimates of Startz's implicit rates downward over the early part of the sample.

The implicit rate calculated by Startz, RDDS, is obtained by using the estimated coefficients C_T and C_L from the regression depicted in equation (1) to impute some of the noninterest expenses to time deposits and loans. Specifically, the volume of loans on the end of year balance sheets of insured commercial banks is multiplied by C_L and the amount of time deposits is multiplied by C_T . The sum of these two components is subtracted from net expenses. The remaining amount of expenses is attributed to demand deposits and is divided by the level of demand deposits yielding an average implicit rate. This slightly overstates the average rate since the constant in equation (1) is not actually zero, but small and positive. The results of this procedure, for the years 1954-68, are reported in column 1 of table I. This implicit rate is seen to be neither zero nor is it the equivalent of a competitive rate.

While Startz's procedure is interesting, it does contain a number of conceptual problems, many of which are pointed out by Rush [10]. The major problems involve the use of accounting data. These data are not conceptually equivalent to measures that are economically important. Specifically the data used by Startz underestimate true economic costs since they omit a normal rate of return as an opportunity cost, giving a downward bias to his implicit rate. This opportunity cost is the cost of attracting capital to the bank.

Another equally important point is that the numbers contained in the report of income and condition are incapable of reflecting the extent to which foregone earnings enter the implicit rate. For instance, if a depositor is charged a lower loan rate based on his average demand deposit balances, this would constitute an implicit payment on these balances, but would not be reflected as an expense on the bank's accounts. Therefore, the bank's foregone earnings will not be allocated as part of an implicit rate on demand deposits. As a practical matter Rush shows that this downward bias is important.

Another problem with Startz's procedure is that it uses average costs and therefore produces an average rate of return. In terms of economic behavior it is a marginal rate that is important. That is, individuals will determine the amount of their money holdings in

Table I

	Startz's Rate	Barro and Santomero's Rate	Klein's Rate	RS	RCP
1954	.85	1.50	1.08	2.87	1.58
1955	.91	1.50	1.61	2.94	2.18
1956	.93	1.50	2.57	3.03	3.31
1957	1.04	1.57	2.96	3.26	3.81
1958	1.06	1.57	1.78	3.38	2.46
1959	1.14	1.59	3.12	3.53	3.97
1960	1.27	1.72	2.98	3.86	3.85
1961	1.20	1.72	2.17	3.90	2.97
1962	1.19	1.72	2.43	4.08	3.26
1963	1.23	1.77	2.66	4.17	3.55
1964	1.15	1.80	3.03	4.18	3.97
1965	1.07	1.93	3.40	4.23	4.38
1966	1.18	2.12	4.40	4.45	5.55
1967	1.22	2.26	3.97	4.67	5.10
1968	1.58	2.42	4.72	4.67	5.90

any particular account based on what the next dollar will earn when placed in that account. Therefore, for Startz's measure of an implicit rate to be useful, the average rate must closely approximate the marginal rate of return on demand deposits. This may not be the case especially with regard to individual demand deposit accounts. In many instances the amount of services provided for an account is not directly related to average balances but to the activity within the account. Banks often provide free processing of checks based on a minimum balance or minimum average balance requirement. For accounts meeting these requirements the amount of free services an individual receives depends upon the amount of checks written, and not on the amount of money on deposit. Therefore, although the average return on demand deposit balances is positive, the marginal return is zero.⁴

⁴As the level of market interest rates changes banks seem to respond by changing minimum and minimum average balance requirements, thus changing the point at which demand deposits in certain types of accounts earn a marginal rate of zero. For instance, a prolonged rise in the level of interest rates would prompt banks to change their minimum balance requirements. A marginal rate of zero would occur at a lower level of balances and individuals would hold less money in a demand deposit

Also, since it is the value placed on services that is important, using cost data brings about another problem. This implicit rate can move for two distinct reasons, each of which has a different implication. In one case the implicit rate could rise because more services are being provided free of charge, while in the second case existing services could become more costly. Only in the first case would the depositor place a greater return on the holding of demand deposits.

Barro and Santomero's Method: The Construction of a Marginal Remittance Rate

Another method for constructing implicit rates is employed by Barro and Santomero [1]. By using a private survey the authors are able to obtain the rate at which charges are remitted as a function of

account. One also would expect that measurements of implicit interest rates would rise as well, and that the implicit rate is proxying for this type of behavior. Including an implicit rate might therefore be preferable to omitting it, but it would be better to analyze the relevant factors determining the level of demand deposits directly. Since banks offer a menu of accounts, the optimal procedure would be to analyze each type of account separately. For an example of this, see Boyd [4].

average deposit balances.⁵ This rate of remittance can be used to calculate a marginal rate of return on demand deposits since it indicates the rate earned by an extra dollar of demand deposits. Because this rate is a marginal rate and is derived from an actual schedule of remittance it is a valuable contribution to the literature on implicit interest rates.

The implicit rate calculated by Barro and Santomero, RDDBS, is displayed in column 2 of table I. Like Startz's rate, this rate is not zero. Its movement also appears to closely follow the movements in the rate paid on savings and loan shares, RS (column 4, table I). The differential between RS and RDDBS is fairly constant, especially over the latter part of the period when the authors indicate greater confidence in their implicit rate calculations. RDDBS also does not appear to be equivalent to a competitive rate.

A weakness of this approach is that it is limited to accounts in which service charges are remitted as a function of average balances. This practice while common for commercial depositors is not widely used for household accounts. As pointed out by Boyd [4], banks tend to offer an array of accounts that provide services and remit charges in different ways. Some accounts require minimum balances, while others base their remittance of charges on average balances. Some even tie their schedule of services with the holding of funds in other types of accounts.

It may be that the rate calculated by Barro and Santomero is not an exogenous constant from the standpoint of the depositor. The depositor may be able to influence the rate by altering his average balances. (This would be especially true if the remittance rate were nonlinearly related to deposit size.) For instance, once deposit balances have grown to the point where all service charges have been remitted, the return on the next dollar deposited would be zero. However, once a depositor reached this point the bank would presumably reward him in other ways.

⁵Barro and Santomero asked the top 100 commercial banks to provide a time series for the remittance of service charges on various types of demand deposit accounts as a function of average balances. They used the rate information on smaller accounts in the hope of excluding commercial accounts, or at least large commercial accounts. A typical piece of information would be that service charges were remitted at the rate of \$.15 per month per 100 dollars of average balances, which would correspond to a rate of 1.8 percent. This was appropriate for the purposes of their study since they concentrated on household accounts. For an examination of M1 it is necessary to also include a measure of the implicit rate received by businesses, or to study the demand for money by households and businesses separately. Data limitations make it difficult to implement the latter suggestion.

The derived rate of Barro and Santomero also assumes that an account receiving implicit interest through remittance of service charges is receiving only this particular benefit from the bank. If a demand depositor simultaneously received a remittance plus favorable terms on a loan, the terms being based on average deposit size, then the Barro and Santomero measure would understate the true implicit rate. Essentially, one can view the Barro and Santomero rate as the correct marginal rate under the assumption that banks tailor the means of paying an implicit rate to their customers, and that each method roughly yields the same rate. In this context the rate calculated for one type of account would be a reasonable approximation for rates on all types of accounts.

Klein's Method: A Competitive Rate

The third method examined is a competitive implicit interest rate derived by Klein [8]. Klein reports an implicit rate for M1, but this is easily converted into an implicit rate on demand deposits. The results are displayed in column 3 of table I. Basically Klein assumes that the regulation forbidding explicit interest payments on demand deposits is costlessly evaded. Competitive pressures within the banking industry force banks to offer the equivalent of a competitive rate in order to attract depositors.

Formally, Klein's implicit rate, RDDK, is expressed in equation (2).

$$(2) \quad RDDK = RCP \left(1 - \frac{r_{DD}}{DD}\right) + \\ (RCP^w - RDIS^w) \frac{BR}{DD} \frac{r_{DD}}{r_D} + \\ RCP(GDD - r_G) \frac{1}{DD} \frac{r_{DD}}{r_D} - L_D - S_{DD}$$

Defining notation: DD are demand deposits, RCP is the rate of 4-6 month commercial paper, r_{DD} are reserves held against demand deposits, r_D are total reserves, RCP^w is a weighted annual average of the commercial paper rate with the weights being determined by monthly discount window borrowings, $RDIS^w$ is a similarly weighted average of the discount rate at the Federal Reserve Bank of New York, GDD are government demand deposits, r_G are reserves held against government demand deposits and are assumed to be the same as the average for ordinary demand deposits, L_D are expected losses on deposits and are zero for the period 1954-68 examined in this study, and S_{DD} are average service charges per dollar of demand deposits.

Equation (2) implies that banks remit the short term market rate of interest adjusted for reserves held against demand deposits, plus any subsidies received from discount window borrowings and the holding of government deposits (government deposits receiving a zero rate of interest) minus service charges. With the exception of the last term, Klein's rate may be interpreted as a marginal rate if the level of discount window borrowings permitted and the level of government demand deposits at a bank are related to bank deposit size. Also, this rate is likely to be highly collinear with the commercial paper rate if the reserve ratio ($\frac{r_{DD}}{DD}$), or the remaining terms in equation (2) do not possess sufficient variability.

Klein's rate has certain attractive properties not found in the other two rates. Unlike Startz it doesn't use accounting data and therefore doesn't suffer from the biases inherent in that procedure. Also, Klein's derivation doesn't require any assumptions about the specific way that implicit interest payments are made, or the relationship between various ways of making such payments. It therefore circumvents some problems that potentially affect the Barro and Santomero procedure.

However, Klein's rate is not without problems. For example, the level of services provided by banks to depositors may not adjust continuously with changes in market rates. That is, it may be very costly to make instantaneous adjustments in the level of services provided or the technology for producing services may be such that continuous adjustment is impossible. Banks may only be able to offer a discrete set of services and may require market rates to move by some threshold amount before offering additional services.

The ability to offer a competitive rate that adjusts rapidly may be more of a problem regarding household accounts than it is with respect to corporate accounts. For instance, large corporate customers often use many different services ranging from the extension of credit at favorable terms to sophisticated cash management techniques. The terms at which credit is extended are often related to average demand deposit holdings, while cash management services are paid for by some combination of compensating balances and fees. The method of payment is tailored to each customer and the rate that compensating balances yield is tied to market rates dis-

counted by some portion of the reserve requirement.⁶ These rates are usually adjusted monthly making the implicit rate very close to a competitive rate for large corporate customers. It is unclear whether such easy adjustment is possible for depositors who do not use a large array of bank services.

Some indirect evidence presented by Rush [10] implies that a competitive implicit rate is not a bad approximation. He compares the relative change in bank profitability between banks in New England States offering NOW accounts (Massachusetts and New Hampshire) with banks in the same region that did not offer these accounts (namely banks in New Jersey, Connecticut, and Vermont). The profitability ratios are examined both before and after the introduction of NOW accounts. If implicit rates are less than competitive, and the explicit payment allowed on NOW accounts is close to a competitive rate, then the profitability of banks offering NOW accounts should decline if implicit payments are less than competitive. If the ratios remain roughly the same, then the evidence favors the hypothesis that implicit rates are competitive. Rush's results can generally be viewed as favoring the hypothesis that implicit rates are competitive.

There are some additional problems that are common to Klein's rate and the estimates in the other two studies. Each estimate attempts to measure the value that depositors place on free services obtained from the bank per additional dollar of deposits. The cost to the bank of providing these services need not be equivalent to the value placed on these services by the depositor. In general the depositor would prefer an explicit payment implying that these rates are biased upward. However, explicit payments are taxed while services not charged for aren't. This factor will bias the implicit rates in the opposite direction. The sum of these offsetting effects is unclear and will depend on individual preferences and marginal tax rates.

III.

A COMPARISON OF THE VARIOUS ESTIMATES OF THE IMPLICIT RATE ON DEMAND DEPOSITS

As indicated in the preceding section all of the various implicit rates contain interesting information, but each suffers from a number of problems. The question then remains, are the problems so large as to make these estimates unproductive. In part this

⁶For more detail concerning the payment for cash management services, see Simpson [11].

question can only be answered by examining their explanatory power when used in studies of the demand for money. This is done in section IV. However, it may be useful to compare the measures themselves.

The comparison between all three rates is contained in table I and in figure 1. Column 1 of table I contains Startz's rate, RDDS; column 2 contains the marginal rate calculated by Barro and Santomero, RDDBS; column 3 displays the competitive rate derived by Klein, RDDK; column 4 exhibits the average annual dividend rate of shares of savings and loan associations, RS; while column 5 displays the 4-6 month commercial paper rate, RCP. The time period examined is 1954-68 since this is the period over which the various rates overlap. Figure 1 is a graph of each implicit rate allowing for easier comparison.

As can be seen from both table I and figure 1 the levels of the rates are quite different, but the movements of the various rates over time are correlated. The exact correlation is displayed in table II. The information contained in table II indicates that all three rates are highly correlated.

IV.

THE USE OF IMPLICIT RATES IN THE STUDY OF THE DEMAND FOR MONEY

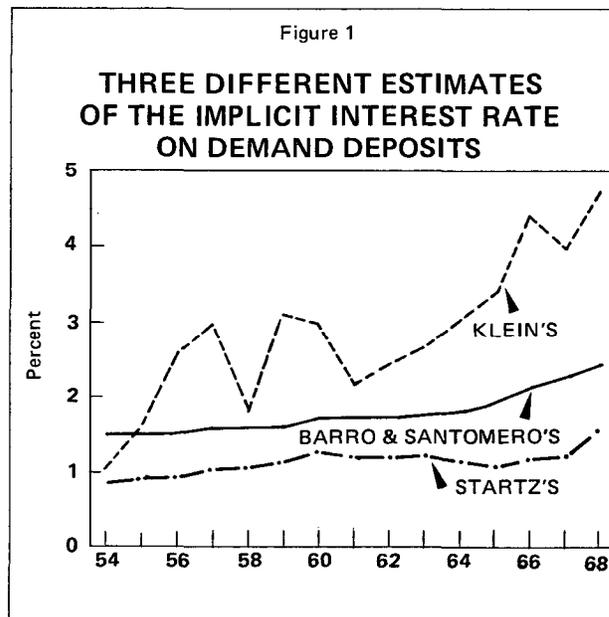
In order to evaluate the usefulness of each of the three proxies, their explanatory power is compared in a demand, for money equation over the period 1954-68. The following equation was estimated using annual data.

$$(3) \ln\left(\frac{M1}{P}\right) = a_0 + a_1 \ln\left(\frac{\text{consumption}}{P}\right) + a_2 (RCP - RDD_i) + a_3 (RS - RDD_i)$$

$i = 1 \text{ to } 4$

where $RDD_1 = 0$, $RDD_2 = RDDS$, $RDD_3 = RDDBS$, and $RDD_4 = RDDK$. M1 is equal to currency plus demand deposits and P is the GNP deflator. In equation (3) real money demand is expressed as a function of real transactions income, which is approximated by real consumption,⁷ and the

⁷ Consumption was used as a scale variable since I believe that it is more closely related to transactions income. In Dotsey [6], it is found to be superior to GNP in explaining demand deposit behavior. Also, many studies of money demand use permanent income as a scale variable. Since consumption is closely related to permanent income one may also wish to interpret the equation in terms of permanent income rather than transactions income. For more detail see [6].



opportunity cost of holding money. Two opportunity costs are used since different individuals may have access to different rates. The opportunity costs are expressed as differentials in interest rates and have been entered in semilogarithmic form for the reasons outlined in Friedman and Schwartz [7; p. 265]. Basically, this specification assumes that the absolute level of opportunity costs is important in determining the demand for money balances. This implies that a doubling of the opportunity cost from 1-2 percent would have a smaller effect than the doubling of the opportunity cost from 5-10 percent. In a log linear model both changes would have an equivalent effect.

The results of the four regressions given in equation (3) are contained in table III. The effect of including the implicit rate derived by Barro and Santomero is especially striking. The standard error of the regression declines by 38 percent, while the presence of serial correlation is greatly reduced.

Table II

CORRELATION COEFFICIENTS BETWEEN THE VARIOUS IMPLICIT RATES

	RDDS	RDDBS	RDDK
RDDS	1.00	.78	.71
RDDBS	.78	1.00	.85
RDDK	.71	.85	1.00

Given the results of using Barro and Santomero's implicit rate, a possible interpretation of the serial correlation in the regression that omits implicit rates is that the regression is misspecified. The correlation present in the errors occurs because the equation fails to take into consideration an important variable that influences the demand for money.⁸

The implicit interest rate derived by Startz does not seem to be a useful measure in explaining the demand for money. Its addition actually reduces the performance of the regression. On the other hand, Klein's competitive implicit rate improves the demand for money equation slightly. Of interest in this latter case is the large change in the coefficients on the interest rate variables from those in the other three equations. Unfortunately, the manner in which this rate is calculated makes it difficult to evaluate its econometric performance. The derivation of Klein's rate makes the presence of spurious correlation possible, and since these effects are similar to the type of effects expected in theory, it is generally difficult

⁸The regressions also were corrected for first order serial correlation. Although the standard errors are greatly reduced the general message is unchanged.

to discriminate between the two.⁹The nature of the spurious correlation can be seen by examining the first term on the right-hand side of equation (2), $(1 - \frac{r_{DD}}{DD})$ RCP. If measurement error is involved in obtaining the level of demand deposits then there will exist a positive correlation between $(1 - \frac{r_{DD}}{DD})$ and DD, and hence M1. For instance, if the measurement of demand deposits is greater than the actual value, then the values of both M1 and $(1 - \frac{r_{DD}}{DD})$ will be raised. This is indeed regrettable since a competitive rate seems to be a reasonable approximation for an implicit rate, especially with respect to corporate accounts.¹⁰

⁹For a more detailed discussion, see Carlson and Frew [5]. Friedman and Schwartz [7] also present an interesting discussion in footnote 46, pp. 270-74. Friedman and Schwartz present evidence over a much longer sample period, where they look at data over peaks and troughs of business cycles. Klein's rate more accurately reflects real rather than spurious effects in their money demand equations.

¹⁰When RS-RDDK is dropped from the third regression, the coefficient on RCP-RDDK drops dramatically, and when RCP-RDDK is eliminated the coefficient on RS-RDDK is insignificantly different from zero.

Table III

REGRESSION RESULTS ON THE $\ln(\frac{M1}{P})$ 1954-1968

Explanatory Variables	Equation 1	Equation 2	Equation 3	Equation 4
CONSTANT	.10(1.17)	.19(1.19)	.27(6.98)	.23(3.20)
LN (Real Consumption)	.81(6.90)	.60(3.16)	.49(12.86)	.66(7.19)
RS	-.16(-66.04)			
RCP	-.008(-1.25)			
RS - RDDS		-.13(-2.60)		
RCP - RDDS		-.008(-.66)		
RS - RDDBS			-.13(-10.52)	
RCP - RDDBS			-.012(-2.83)	
RS - RDDK				-.063(-5.82)
RCP - RDDK				-.51(-5.76)
S.E.R.	.0138	.0224	.00858	.0137
R^2	.86	.64	.95	.87
D.W.	.86	.67	1.81	1.49

t-statistics are in parenthesis.

V.

SUMMARY AND COMMENTS ON THE EFFECTS OF DEREGULATION IN THE BANKING INDUSTRY

In this article the value of incorporating an implicit interest rate in money demand analysis has been examined. Specifically, three very different constructions have been investigated. While all three are interesting, the rate derived by Barro and Santomero seems to be the most useful in the context of analyzing the demand for M1. Although additional information on the ways implicit interest is paid by banks is desirable, the results obtained here indicate that this variable merits updating. Klein's rate, although it is probably a good proxy for interest implicitly earned by corporate customers (and may be a good estimate for all depositors) is unfortunately plagued by econometric problems that make interpreting its effect in regression equations difficult. The rate derived by Startz is subject to a number of procedural problems and did not prove to be very useful in explaining the demand for money over the rather short sample period studied in this article.

The general conclusion is that implicit rates, especially the approximation generated by Barro and Santomero are important elements in determining the demand for money. This being the case, these rates will also be important in analyzing the effects of current and future deregulation in the banking industry. A detailed analysis of the effects of deregulation would be somewhat beyond the scope of this study, but a limited discussion is germane to the main thrust of the article.

In order to understand the ways in which deregulation has affected and will affect the behavior of monetary aggregates, in particular M1, it will be necessary to examine the rate of returns that new transactions accounts yield relative to the rates im-

PLICITLY earned by demand deposits. This is because it is this differential that constitutes the opportunity cost of continuing to use a standard demand deposit account. For instance, the 5¼ percent interest rate paid on NOW accounts overstates the relative advantage of using a NOW account, since demand deposits implicitly earn a rate of return greater than zero.¹¹ Without considering implicit rates it is difficult to understand why all consumer accounts did not switch to NOW accounts almost immediately. For certain types of depositors a NOW account may offer very little if anything beyond that of a regular demand deposit.

Of course, considering only implicit rates in an analysis of the differences between demand deposits and newer types of transactions accounts would be too limiting. There are many characteristics that distinguish one type of account from another. Minimum or average balance requirements would be an example of such a characteristic. It may also be that banks offer different implicit rates to different types of depositors. A deeper understanding of the demand for money may require that different types of accounts be studied separately. Data limitations unfortunately prevent analysis at this level.

The point of this article is not to detract from the importance of other features that determine the behavior of depositors, but to describe the effects that implicit rates have on the demand for money. Although implicit rates are only one aspect that influence the choice between transactions accounts, there are numerous reasons for believing that they are an important aspect that require more attention in investigating the demand for money.

¹¹The analysis assumes that at the margin NOW accounts earn a much smaller implicit rate than standard demand deposit accounts.

References

1. Barro, Robert J., and Anthony M. Santomero. "Household Money Holdings and the Demand Deposit Rate." *Journal of Money, Credit and Banking*, 4 (May 1972), 397-413.
2. Becker, William E. "Determinants of the United States Currency-Demand Deposit Ratio." *The Journal of Finance*, 30 (March 1975), 57-74.
3. Boughton, J. M. "Subjective Prices and the Demand for Money." Unpublished manuscript, IMF.
4. Boyd, John H. "Household Demand for Checking Account Money." *Journal of Monetary Economics*, 2 (January 1976), 81-98.
5. Carlson, John A., and James R. Frew. "Money Demand Responsiveness to the Rate of Return on Money: A Methodological Critique." *Journal of Political Economy*, 80 (June 1980), 498-607.
6. Dotsey, Michael. "The Effects of Cash Management Practices on the Demand for Demand Deposits." Working Paper Federal Reserve Bank of Richmond, 1983.
7. Friedman, Milton, and Anna J. Schwartz. *Monetary Trends in the United States and the United Kingdom*. University of Chicago Press, 1982.
8. Klein, Benjamin. "Competitive Interest Payments on Bank Deposits and the Long Run Demand for Money." *American Economic Review*, 64 (December 1974), 931-49.
9. Klein, Michael A. "The Implicit Deposit Concept: Issues and Applications." *Economic Review*, Federal Reserve Bank of Richmond (September/October 1978), 3-12.
10. Rush, Mark. "Comment and Further Evidence on Implicit Interest on Demand Deposits." *Journal of Monetary Economics*, 6 (July 1980), 437-51.
11. Simpson, Thomas D. "The Market for Federal Funds and Repurchase Agreements." Staff Studies 106. Washington : Board of Governors of the Federal Reserve System, 1979.
12. Startz, Richard. "Implicit Interest on Demand Deposits." *Journal of Monetary Economics*, 5 (October 1979), 515-34.