Bank Liability Management and the Efficiency of Financial Intermediation

by

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Most borrowers do not have direct access to the savings or money markets. When they need money, they must turn to banks or other financial intermediaries. These institutions, if they do not have funds, must either turn down the borrower's request or act as his representative in obtaining them from the money markets. They can raise the funds either by selling securities from their own portfolios (sometimes called the "shiftability approach") or by issuing and selling their own obligations (currently usually described as "liability management") [9]. The impact of these two approaches on the money market should be identical when the quality and terms of the securities used are the same but the supply of loanable funds developed by the two approaches depends upon the nature of reserve requirements and the regulatory structure under which the institutions are operating.

Funds raised by issuing obligations subject to reserve requirements are reduced by the amount of required reserves. Funds raised by banks that are members of the Federal Reserve System are further reduced by the intra-member bank substitution effects that arise from limitations imposed by the reserve base [12,15]. The theoretical size of the substitution effects can be calculated if it is assumed that the reserve base is held constant but the implications of this substitution for the intermediation process are hidden by the complexities of the clearing and reserve adjustment process. The amount of the substitution effect measures a leakage from the funds raised by member banks and appears as a reduction in the aggregate volume of new loans that

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can be made from a given volume of money market financing. The individual banker who sells the CD's other obligations will be unaware of the leakage. He will have received the full amount of funds that he expects from the transaction. The losses of reserves, either at his bank or at other member banks, that arise from the substitution effect will never be specifically identified with the initial transaction.

If sizable leakages of this type occur, the aggregate amount of loan funds raised by member banks by liability management for a given change in money market rates should be smaller than the aggregate amount that can be raised by direct financing, by the "shiftability" approach or by liability management at nonmember banks or by savings institutions. Such differences should be detectable in aggregate statistical data in two ways. First, the efforts of member banks to raise funds by selling CD's or expanding their time accounts should have a measurably different effect on interest rates than more efficient approaches. Second, shifts from less efficient to more efficient approaches should have a measurably different effect on interest rates than shifts among approaches that do not result in substantial leakages, i.e. disintermediation as it effects member banks should have a measurably different effect on interest rates than disintermediation at savings institutions. Tests described in the following sections produce evidence of both effects and suggest that the concealed leakages arising from member bank liability management have contributed to the recent volatility of short-term interest rates.

Since bank liability management techniques are used during periods of rising loan demands, the leakages that they imply add to the inelasticity of the interest rate response during periods of rising interest rates.

When the loan demand subsides and banks permit their CD's to run-off, the process is reversed and bank disintermediation contributes to a more rapid decline in interest rates. The recognition and measurement of these effects could add to the versatility of monetary controls. If they are not recognized, the danger arises that policies intended to ease money market conditions may be relatively ineffective.

There have been a number of developments in recent years that suggest that the demand for money balances has become highly insensitive to interest rate changes at high levels of rates. Marty [11] and others have suggested that the growth of money substitutes has shifted the money demand function to the left and has in good part extinguished holdings of "precautionary" and "speculative" balances. Cagen and Schwartz [1] have obtained empirical evidence that supports this position. If this is the case, the remaining elasticity must be derived largely from transactions balances and there is evidence that the extensive development of cash management procedures has reduced these balances. In this environment and if the intra-member bank substitution effect exists, policies that encourage member banks to compete for money market funds will intensify interest rate pressures. Under extreme conditions, it is theoretically possible that the direct substitution of member bank liability financing for more efficient approaches to the market could reduce the volume of loan funds. It is unlikely that such events would ever be observed because the interest rate pressures would force the authorities to abandon any monetary aggregate targets for interest rate targets. New reserves can be used to offset the leakages that arise from the intra-member bank substitution effects, but the recognition of the problem in advance would give the authorities a wide choice of policy alternatives.

Alternative methods of raising funds

When new funds are raised by either direct financing or by "shiftability approach" the entire amount (net of transactions cost) is available for new loans. When the funds are raised by liability management and the obligations used are subject to reserve requirements, the amount available for loans will be smaller by the amount of the required reserves. If ΔF is the amount of new funds raised and t is the required reserve ratio, the amount available for loans (ΔL_1) will be equal to

$$\Delta L_1 = \Delta F(1-t) \tag{1}$$

When the funds are raised by a bank that is a member of the Federal Reserve System, the new loans funds available to the individual bank will be given by equation (1). But, when there are no excess reserves in the System, the addition of the new deposits to the member bank total will result in a reserve deficiency someplace else within the System. The complexity of the clearing process obscures the effects of the transaction but in the absence of any new sources of reserves some adjustment has to be made. An aggregate expansion can take place only if the required reserve ratio (d) on the accounts that are replaced is larger than the required ratio on the new funds (t). The sum of the two reserve adjustments must be equal.

$$t\Delta F = d\Delta D \tag{2}$$

Some bank or banks with the System will face a loss of reserves and must adjust their loans and deposits to correct the deficiency. The contraction in the supply of loans (ΔL_2) will be

$$\Delta L_2 = \Delta D(1-d) \tag{3}$$

This can be expressed in terms of the original fund raising transaction by substituting from equation (2) to obtain

$$\Delta L_2 = t\Delta F(1-d)/d \tag{4}$$

The net supply of loanable funds (ΔL) resulting from the initial attempts to raise funds will be:

$$\Delta L = \Delta L_1 - \Delta L_2 = \Delta F(1-t) - t\Delta F(1-d)/d \tag{5}$$

The bank that raises the funds will only be aware of the first term of this equation. The effects of the second term will be obscured by the reserve clearing process. The effects of the second term can be identified in the aggregate figures only in the unlikely event that nothing else occurs to affect the level of the reserve base.

The amount of leakage from the intermediation process that results from the use of liability management techniques can be measured as the difference between the funds raised in the money markets (ΔF) and the aggregate amount of new loans (ΔL).

$$\Delta F - \Delta L = \Delta F t/d \tag{6}$$

The amount of this leakage depends upon the types of accounts involved and the applicable reserve ratios. It can range from 18.2 percent when the new funds are raised in low reserve requirement accounts (3 percent) and the substitution occurs from high reserves requirement accounts (16.5 percent) to 80 percent when the funds are raised with 6 percent reserve ratio accounts from relatively low reserve requirement accounts (7.5 percent). The limiting case of 100 percent leakage that occurs when funds are raised by one bank at the direct expense of funds of the same type from another member bank illustrates the type of substitution effect that is involved in the cases of partial leakage.

These calculations involve the assumption that there is nothing about the adjustment process that will result in the creation of new reserves.

The process will, however, put pressure on interest rates and may lead to additional borrowing from the Federal Reserve System. But these adjustments introduce an additional source of funds--the Federal Reserve System. It is sometimes argued that the actions of member banks may remove some of the freedom from the System policy actions but for purposes of examing the implication of the reserve requirement structure it seems appropriate to assume that the System can refuse to support some of the pressure placed on it by member banks actions in attempting to meet new loan demand.

It should be noted that the hidden leakage that accompany the attempt of member banks to raise funds by liability management arise from the constraint of having to share a reserve pool that can be limited in size. The reaction does not follow from liability management activities of nonmember banks or of other institutions whose reserve requirements can be met with funds that do not necessarily produce reserve deficits for other financial institutions.

Evidence of an intra-member bank substitution effect

The preceding description of potential leakages in the intermediation process suggests that the effective loan supply could vary between two potential extremes. If transaction costs are assumed to be the same for all approaches, the most efficient alternative in terms of the amount of loan funds raised with a given change in the interest rate, would occur when all of the funds were raised directly by the borrower or by financial institutions using the shiftability approach. The least efficient alternative would occur when all of the funds were raised by members of the Federal Reserve System using liability management techniques.

Data for "total funds raised and advanced in credit market" are available from the Flow of Fund Accounts published by the Board of Governors of the Federal Reserve System. Since changes in the major components of this total can be identified, it should be possible to detect the response of the market to the use of different techniques for raising funds. A variable measuring the amount of funds raised by member bank liability management financing would be expected to show a negative coefficient with respect to short-term interest rates when it is added to an equation (or model) that includes the major determinates of the interest rate. If the intra-member bank substitution effect is important, it would also be expected that the coefficient would be significantly smaller than that obtained by the addition of a variable for a similar type of nonbank financing. The effects of quarterly changes in member bank holdings of CD's and time and savings accounts were compared to the effects of quarterly changes in nonbank savings accounts and the comparisons resulted in the anticipated differences. Separate comparisions of CD's with nonbank savings accounts showed the same pattern of results but the results for CD's were not statistically significant.

The reduced form equations used by Feldstein and Eckstein in their paper on the determination of corporate bond rates seemed best suited as a model for the tests [5]. The fundamental equation used income and the monetary base as the basic independent variables. They found that a simple equation specified in terms of the logarithms of per capita real gross national product and the real per capita monetary base provided a good explanation of the variations in the yields on seasoned Moody's Aaa bonds. A similar equation, modified somewhat for the special problems of this study, provided a reasonable explanation of the variations in the 3 month U.S. Treasury bill rate (see equation 1 in Figure 1).

The Feldstein and Eckstein equation was modified in three principal ways. Unadjusted data were used instead of seasonally adjusted data to provide for the possibility of important seasonal variations in the pattern of financing. An adjusted member bank reserve base was used instead of the monetary base to eliminate the impact of some of the adjustments made by the St. Louis Federal Reserve Bank in deriving the monetary base. Their use of variable weights for adjusting for the effects of changes in the reserve ratios transfers some of the potential effects of liability management to the monetary base [6]. The per capita corrections did not alter the explanatory power of the short-run equation and were omitted in the final runs.

When changes in member bank time and savings accounts (including CD's) were added to the basic equation, the explanatory power of the equation was not significantly increased, the regression coefficient was small (-.029) and of doubtful statistical significance (see equation 2, Figure 1). Similar results were obtained when changes in CD's alone were used. However, when changes in the accounts of nonbank savings institutions were added to the basic equation, the explanatory power of the equation was increased (the r^2 increased from .59 to .80) and the regression coefficient of -.258 was statistically significant (see equation 3, Figure 1).

The differences between the interest rate effects of two very similar forms of financing suggests the existence of interaction effects on the time deposit variable that are not specified by the equation in this form. The differences cannot be attributed to the inclusion of the member bank reserve base as a variable because essentially the same results are obtained when the reserve base is omitted although the explanatory power of the equation is reduced (see equations 4 and 5 in Figure 1).

Evidence of a hidden intra-member bank substitution effect associated with liability management is provided by the change in the regression coefficient for the member bank time account variable when a variable for changes in member bank demand accounts is added to the equation. The time account coefficient doubles in size and becomes statistically significant. This change indicates a relationship between the two variables that can be approximated from the change in the coefficient of the time account variable that results from the addition of the new variable with the assumption that values of other coefficients are unaffected.

$$b_t = b_{t \cdot d} + b_{d \cdot t} \, \partial d/\partial t$$

$$-.0289 = -.0662 + (-.1196) \, \partial d/\partial t$$

$$\partial d/\partial t = -.3118$$

where: b = regression coefficients

t = change in time accounts

d = change in demand accounts

The derived value for the interrelationship between changes in time and demand accounts is slightly smaller than the one that would be expected from the ratio of the average reserve requirements on the types of deposits that might be involved in the substitution process. The partial correlation coefficient between changes in demand accounts and changes in time accounts was - .423 (with income, the reserve base and the interest rate held constant). This value is consistent with the substitution effect that would be expected from average reserve ratios of about 3 percent on time accounts and 14 percent on demand accounts or 4 percent on time accounts and 11 percent on demand accounts.

After the removal of the effects of intra-member bank deposit substitution, the coefficient for changes in member bank time accounts is still only about

one fourth as large as that for changes in nonbank savings accounts. If the interest rate impact of those two types of accounts should be similar, some unidentified influences must still be unaccounted for. One further possibility arises in possible substitution effects between bank activities and various types of money market securities or nonbank savings accounts [5, 15].

Effects of disintermediation

If all alternatives for financial intermediation were equally efficient, competitive or regulatory changes that lead merely to changes in the importance of various alternatives should have no significant effects on interest rates or on the total volume of financings. However, if some alternatives are less efficient than others, shifts in the importance of these alternatives should have a measurable impact on interest rates. Distermediation that leads to a relative decline in the importance of member bank CD's and other time accounts as a source of funds should produce lower interest rates than the same volume of financing under the same conditions with a larger role played by member banks.[1/]

Dummy variables were developed to record shifts in the relative importance of different financing techniques to test for this disintermediation effect. Quarterly data for the "total funds raised in credit market" (net of the changes in demand deposits) from the Federal Reserve System's moneyflows data were used as a measure of total financing. A decrease in the relative importance of member bank liability management financing in this total was assigned the value of - 1.0 and an increase was assigned a value of + 1.0. The index value was zero when there were no significant changes in the financing shares.

[1/] A number of studies of the effects of deposit rate ceilings on interest rates deal indirectly with this problem [7, 13, 16]. However, the results of these studies are not in agreement. None of them consider explicitly the possibilities of the substitution effect or provide for it in the specification of their models.

Thus the negative values of the index indicated quarters in which disintermediation from member banks was occurring to some degree and the positive values indicated quarters when the member bank share was increasing relative to other sources. The inclusion of this index of disintermediation in the standard interest rate equation added appreciably to the explanatory power of the equation and showed a significant and negative relationship between disintermediation from member banks and the interest rate (see equation 7 in Figure 1). A similar index developed for nonbank savings institutions was not statistically significant (see equation 8, Figure 1).

These results support the joint hypothesis that shifts of funds among financing paths of differing levels of efficiency affect interest rates but that shifts among paths of similar levels of efficiency do not and that member bank liability financing is less efficient than other approaches to the money market. They can also be regarded as indirect evidence of the intra-member bank substitution effect.

Summary and conclusions

A variety of statistical evidence points to the existence of an intra-member bank substitution effect that reduces the combined efficiency of member banks in using liability techniques for raising new loan funds. The statistical approximations of the magnitude of the effect are consistent with theoretical expectations.

The importance of the intra-member bank substitution effect arises from the unrecognized inelasticity that it adds to the response to changes in money market rates. The Federal Reserve System can offset these effects but the explicit recognition of the role of the substitution effect would reduce the size of the response required to achieve specific interest rate targets. During periods of tight money, a given interest rate target could be achieved

with a smaller adjustment in the reserve base if the adjustment were accompanied by policies that discouraged member banks from selling CD's or other obligations in the money markets. The interest rates required for a given loan expansion would be less if nonmember banks and nonbank savings institutions were encouraged to raise the funds. The unpleasant competitive connotations of these policies for members of the Federal Reserve system are a by-product of the regulatory structure that ties the regulation of the money supply and the regulation of the savings and money market obligations of member banks to the same reserve base. It is instructive to reread the report of the Commission on Money and Credit in 1961 that recommended that banks be permitted to expand their activities in the savings and money markets. With what now appears to be amazing foresight, they recommended that the new savings activities be subject to a special reserve requirement that was independent of the reserve base used to control the money supply [2].

Figure 1

Regression Equations For 90 Day U.S. Treasury Bill Rate

	Constant Term	ℓnY	ℓnR	ΔT	ΔD	ΔS	DIS-M	DIS-S	R^2 (S.E.)
1.	-36.8	12.80 (5.7)	-13.84 (-2.5)	--	--	--	--	--	.5868 (1.029)
2.	-38.4	13.16 (5.7)	-14.16 (-2.5)	-.03 (-0.9)	--	--	--	--	.5932 (1.021)
3.	-53.5	12.60 (7.9)	-7.48 (-1.9)	--	--	-.26 (-7.2)	--	--	.8001 (.716)
4.	-46.7	7.92 (7.4)	--	-.03 (-0.7)	--	--	--	--	.5388 (1.087)
5.	-58.8	9.95 (13.1)	--	--	--	-.27 (-7.6)	--	--	.7854 (.741)
6.	-45.3	15.61 (7.9)	-16.94 (-3.3)	-.07 (-2.0)	-.12 (-3.3)	--	--	--	.6681
7.	-35.8	13.41 (6.0)	-15.46 (-2.8)	--	--	--	.28 (1.9)	--	.6150 (.993)
8.	-37.3	12.91 (5.7)	-13.92 (-2.5)	--	--	--	--	.13 (0.9)	.5933
9.	-57.9	14.51 (11.5)	-10.09 (-3.3)	--	-.09 -10.1	-.28 (-3.9)	.19 (2.0)	--	.8884 (.535)

Note: ℓnY: natural logarithm of quarterly GNP figures at annual rates without seasonal adjustments.

ℓnR: natural logarithms of total member bank reserves, quarterly averages of daily figures without seasonal adjustments.

ΔT: quarterly changes in time and savings accounts of member banks, without seasonal adjustments.

ΔD: quarterly changes in demand accounts of member banks, without seasonal adjustments.

ΔS: quarterly changes in savings at nonbank savings institutions, without seasonal adjustments.

DIS-M: disintermediation index for member banks--dummy variable measuring changes in the relative importance of member bank time and savings accounts in the total funds advanced in credit markets (net of changes in member bank demand deposits). Variable was given a value of +1.0 when member bank share increased and a value of -1.0 when disintermediation occurred.

DIS-S: disintermediation index for savings institutions--dummy variable measuring changes in the importance of deposits in nonbank savings institutions in the total funds advanced in credit markets (net of changes in member bank demand deposits). Variable was given a value of +1.0 when savings bank share increased and a value of -1.0 when disintermediation occurred.

t statistic in parentheses.

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