

Deposit Deregulation, Credit Availability, and Monetary Policy

By William R. Keeton

In April of this year, the removal of the ceiling on passbook savings accounts completed the substantial deregulation of deposit rates that began in 1978. Concerns are sometimes voiced that deposit deregulation will significantly weaken monetary policy and raise the general level of interest rates. When deposit rates were subject to ceilings, monetary policy affected private spending partly through changes in open market interest rates and partly through changes in the availability of credit from commercial banks and thrifts. According to some economists, the removal of ceilings will greatly reduce the importance of credit availability as a channel of monetary policy. As a result, during times of strong demand, open market interest rates may need to rise to much higher levels than before to restrain the economy and prevent inflation from accelerating.

Economists who fear that deposit deregulation will weaken monetary policy give three reasons for believing that deposit rate ceilings gave rise

to significant availability effects. First, they argue that deposit rate ceilings prevented banks and thrifts from obtaining funds in periods of tight money, forcing them to sharply reduce the supply of credit. Second, they claim that banks and thrifts rationed credit partly through adjustments in non-price lending terms during such periods, causing total lending to fall significantly more than if they had merely raised their loan rates. Finally, it is claimed that these reductions in bank and thrift credit led to large declines in private spending because the nonfungibility of credit prevented borrowers from substituting alternative means of financing.

This article examines the theoretical and empirical evidence on the implications of deposit deregulation for availability effects. The article first reviews the various channels of monetary policy and explains how monetary policy affects the availability of bank credit. It then examines the three key links in the credit availability argument—the effect of deposit rate ceilings on the supply of bank and thrift credit, the propensity of banks and thrifts to ration credit by non-price means, and the nonfungibility of credit. The

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article concludes that deposit deregulation will reduce availability effects but will not reduce them enough to significantly weaken monetary policy.

Monetary policy and availability effects

The channels of monetary policy

The transmission mechanism of monetary policy begins with changes in the rate of return on open market securities. Expansionary monetary policy reduces the rate of return on open market securities while restrictive policy increases the rate of return. These changes in open market rates lead eventually to changes in private spending. Exactly how that happens is a matter of some controversy, but four possible channels can be identified.

Changes in the open market rates may affect the amount of funds that commercial banks and thrifts have available to lend their customers.

The first channel is the cost of open market credit. Changes in open market rates alter the cost to businesses of borrowing in the open market to finance their investment in plant and equipment. Changes in open market rates also alter the opportunity cost to businesses and households of spending their accumulated wealth rather than holding it in open market securities.

The second channel of monetary policy is the wealth effect. Changes in open market rates lead to capital gains or losses on households' outstanding holdings of government securities, corporate bonds, and corporate stock. By altering the need to save for the future, such changes in wealth may raise or lower households' desire to consume in the present.

The third channel of monetary policy is the exchange rate effect. Any changes in U.S. interest rates that are not matched abroad will tend to alter

the value of the dollar relative to foreign currencies. A change in the value of the dollar may raise or lower the amount spent on U.S. goods and services by altering the cost of these goods and services relative to the cost of foreign goods and services.

The last channel of monetary policy is the availability effect. Changes in open market rates may increase or decrease the amount of funds that commercial banks and thrifts have available to lend their customers. One way decreases in lending may be achieved is through increases in loan rates that discourage borrowing. The other way is through credit rationing, the use of nonprice terms to shut marginal borrowers out of the market. Either way, borrowers who lack alternative means of financing may be forced to reduce their spending.

Economists who believe that deposit deregulation has reduced the effectiveness of monetary policy argue that the availability effects used to be very important but have become much less so now that deposit rate ceilings have been removed. If this argument is correct, a higher level of open market rates will now be required to achieve any given degree of restraint on the economy.¹

Availability effects: a closer look

To determine whether deposit deregulation will diminish availability effects, it is necessary to identify the various factors influencing the magnitude of those effects. These factors can be identified by examining the impact of a tight monetary policy on the market for bank loans under alternative

¹ See, for example, Albert M. Wojnilower, "The Central Role of Credit Crunches in Recent Financial History," *Brookings Papers on Economic Activity*, 1980:2; Richard G. Davis, "Credit Market Restraints and the Functioning of Monetary Policy," Research Paper No. 8015, Federal Reserve Bank of New York, September 1980; and Raymond E. Lombra, "The Changing Role of Real and Nominal Interest Rates," *Economic Review*, Federal Reserve Bank of Kansas City, February 1984.

assumptions about deposit rate ceilings and credit rationing.

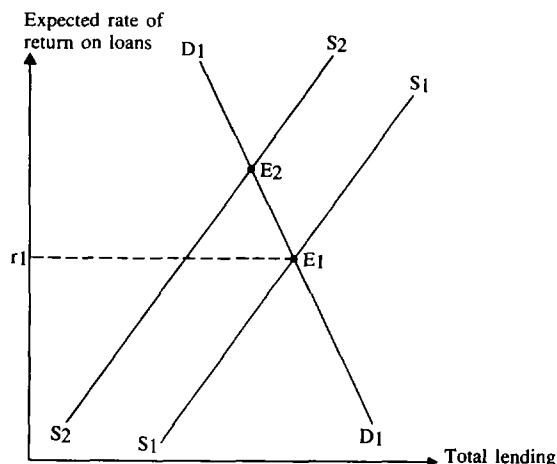
Figure 1 shows how tight monetary policy affects the cost and availability of bank credit in three separate cases—the case of no deposit rate ceilings and no credit rationing, the case of deposit rate ceilings but no credit rationing, and the case of both deposit rate ceilings and credit rationing. In each panel, total bank lending is measured on the horizontal axis and the expected rate of return on bank loans on the vertical axis.² The expected rate of return on bank loans can increase in two ways, through higher loan rates or through stricter nonprice terms that reduce the risk of default. For convenience, Figure 1 assumes that banks do not care what mix of interest rates and nonprice terms is used to achieve any given expected rate of return.

The supply curve SS shows how much banks would like to lend at each expected rate of return on loans, given the rate of return on open market securities. As the expected rate of return on loans increases, the supply of loans increases for two reasons. First, banks may be willing to invest a higher proportion of their available funds in loans rather than open market securities. And second, banks may be willing to pay higher rates on deposits and other liabilities, increasing the total volume of available funds.

The demand curve DD shows how much businesses and households would like to borrow from banks at each expected rate of return on loans. As the rate of return on loans increases, the demand for loans decreases for two reasons. First, higher rates may make bank credit less attractive to borrowers than other methods of financing expenditures, such as borrowing in the open

FIGURE 1
Impact of tight money on the loan market

**a. No deposit rate ceilings
and no credit rationing**



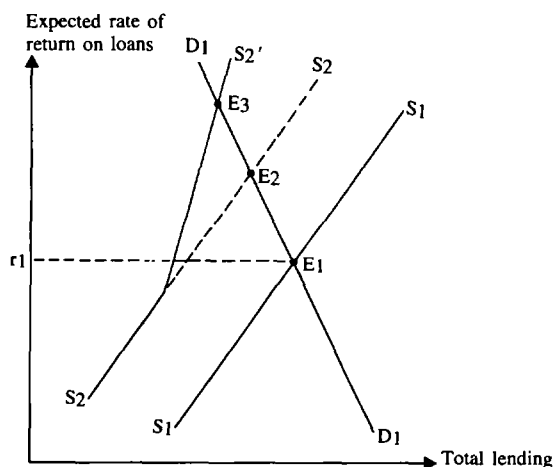
market or drawing down liquid assets. Also, as rates increase, borrowers may reduce their planned spending, decreasing the demand for bank credit indirectly.

Figure 1a shows how a tighter monetary policy will affect the market for bank loans if there is no ceiling on deposit rates and no possibility of credit rationing. The main effect of a tighter monetary policy is to cause a leftward shift in the supply curve, SS. As monetary policy is tightened, open market interest rates will rise, making bank deposits less attractive to the public and loans less attractive to banks. Thus, as long as the expected rate of return on loans remains unchanged, the total amount banks are willing to lend will decline, shifting the supply curve from S_1S_1 to S_2S_2 .³

² The expected rate of return on bank loans is a weighted sum of all possible rates of return to the bank, with each possible rate of return weighted by its probability of occurrence. As long as there is some chance of default, the expected rate of return on a loan will be less than the loan rate.

³ The increase in open market rates could also shift out the demand curve, DD, by making it less attractive to businesses and households to borrow in the open market. Provided the leftward shift in SS exceeds the rightward shift in DD, nothing is lost by ignoring this possibility.

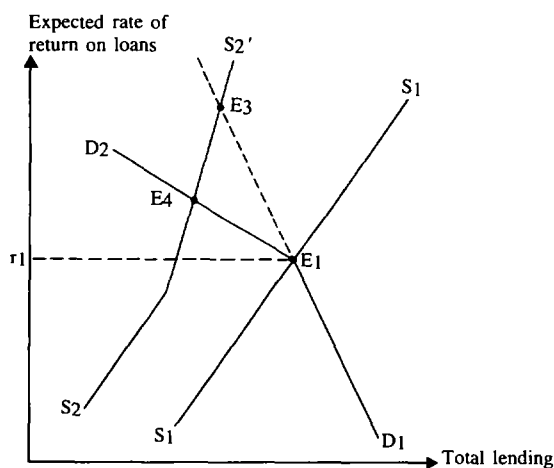
**b. Deposit rate ceilings
but no credit rationing**



The leftward shift in the supply curve caused by tighter monetary policy will lead to a reduction in total bank lending. At the initial expected rate of return, r_1 , borrowers will desire more credit than banks are willing to supply. Thus, borrowers will bid up the expected rate of return on loans and banks will move up their new supply curve, raising their deposit rates to attract more funds and allocating a greater proportion of their available funds to bank loans. This process will continue until the excess demand for loans is completely eliminated. In Figure 1a, the new market equilibrium will occur at E_2 , with a higher rate of return on loans and a lower level of lending.

Figure 1b demonstrates that the same tightening of monetary policy will cause a greater decline in bank lending if ceilings prevent banks from raising their deposit rates. In this case, the supply curve will shift from S_1S_1 to S_2S_2' . As borrowers bid the expected rate of return on loans above r_1 , banks will still want to increase their total lend-

**c. Both deposit rate ceilings
and credit rationing**



ing and move up their new supply curve. However, because banks can no longer attract additional funds by raising deposit rates, the only way they will be able to increase their lending is by substituting loans for holdings of open market securities or borrowing in the open market. As a result, increases in the expected rate of return on loans will induce smaller increases in loan supply than when deposit rates are completely free of ceilings.⁴ Instead of shifting to point E_2 , the market equilibrium will shift all the way to E_3 .

Finally, Figure 1c shows that the tighter monetary policy will lead to a still greater decline in lending if there is not only a ceiling on the deposit rate but a market imperfection that

⁴ The kink in the supply curve occurs at the point where the deposit rate ceiling is just binding, the point where banks would be just content with their initial deposit rates. This point will be below r_1 because banks would want to raise their deposit rates at r_1 and attract more funds to invest in open market securities.

prevents banks from increasing their loan rates. As before, the shift in the supply curve will produce an excess demand for credit at the initial expected rate of return, r_1 . By assumption, however, banks will now be unable to raise their expected rate of return on loans by charging higher loan rates. Instead, the only way for banks to raise the expected rate of return on loans will be to alter nonprice lending terms in such a way as to reduce the risk of default, e.g., by increasing collateral requirements or tightening credit standards.

Any tendency for banks to ration credit by tightening their nonprice requirements would reinforce availability effects by causing more borrowers to go without credit.

Although banks will still be able to move up their new supply curve by tightening their nonprice terms, the effective demand for loans on the part of borrowers will fall more rapidly than if banks raised their loan rates. Some borrowers who would like to receive credit at the prevailing terms will be forced to drop out of the market because they cannot meet banks' stiffer nonprice requirements. Other borrowers who would have been willing to pay higher loan rates to continue receiving credit will voluntarily drop out of the market rather than meet the stricter nonprice terms. Borrowers' effective demand for loans is now represented by a curve such as D_1D_2 , which lies to the left of the original demand curve at all rates higher than r_1 . Thus, instead of shifting from E_1 to E_3 , the market equilibrium will shift all the way to E_4 . In other words, a tightening of monetary policy will produce an even greater decline in bank lending than in the previous case.

With the help of Figure 1, it is now possible to identify three important issues that must be resolved to determine if deposit deregulation will decrease the magnitude of availability effects.

First, to what extent did deposit rate ceilings make banks and thrifts more reluctant to supply credit to their borrowers during periods of tight money? In terms of Figure 1, how much farther to the left did deposit rate ceilings cause the supply curve SS to shift when open market rates rose and how much steeper did the curve become?

Second, to what extent were banks unable or unwilling to raise their loan rates during periods of tight money, causing them to ration credit by nonprice means? In terms of Figure 1, did borrowers move up the demand curve D_1D_1 shown in Figure 1b or the flatter demand curve D_1D_2 shown in Figure 1c? Although monetary policy could have significant availability effects even if the loan market always cleared, any tendency for banks to ration credit by tightening their nonprice requirements would reinforce those effects by causing even more borrowers to go without credit. The more unresponsive borrowers' demand for credit is to increases in loan rates, the more important will be the role played by credit rationing.

Finally, to what extent were bank and thrift borrowers able to maintain their spending during periods of tight money by substituting alternative sources of funds? That is, to what extent was credit fungible? In terms of Figure 1, it is not enough that borrowers be pushed up the demand curve D_1D_1 or D_1D_2 as open market rates rise. For monetary policy to have availability effects, the movement up the demand curve must reflect some decrease in planned spending and not just the replacement of bank credit by alternative means of financing.

Did ceilings reduce the supply of bank and thrift credit?

The impact of deposit rate ceilings on the supply of bank and thrift credit depends on two factors. One is the severity of disintermediation under deposit rate ceilings and the ability of banks and thrifts to make up for disintermediation by tap-

ping alternative sources of funds. The other factor is whether disintermediation would occur even in the absence of ceilings due to deposit rate sluggishness.

Deposit rate ceilings and disintermediation

Deposit rate ceilings were imposed on commercial banks in the 1930s but did not become a serious constraint until the mid-1960s. For the first 20 years, most commercial banks chose to pay relatively low rates on time and savings deposits. But as market rates rose in the late 1950s, commercial banks found it increasingly difficult to finance new lending. The large holdings of government securities they had built up during World War II were running out, corporate customers were becoming more reluctant to hold demand deposits, and thrift institutions were competing more aggressively for savings deposits. Commercial banks responded by raising their deposit rates, eventually bumping up against the ceilings. Once that happened, regulators promptly raised the ceilings, a sequence of events that was repeated several times over the next decade.

During the second half of the 1960s and first half of the 1970s, regulators abandoned the practice of raising deposit rate ceilings as soon as they became binding, giving rise to three separate "credit crunches."⁵ The first crunch came in 1966. As market rates rose to new heights, deposit rate ceilings were not increased because commercial

banks were believed to be outbidding thrifts for deposits. As shown in Chart 1, the failure to raise ceilings did not cause household investment in small time and savings deposits to decline any more in 1966 than it had in 1955 or 1959. However, the low level of ceilings did lead to a sharp drop in sales of large certificates of deposit (CD's), a source of funds that large commercial banks had recently come to rely on. The next credit crunch occurred in 1969-70. That time, market rates exceeded ceilings by an even greater amount and thrifts were subject to the ceilings as well as commercial banks. Not surprisingly, households allocated an even smaller percentage of their savings to small time and savings deposits than in 1966 and sales of large CD's again dried up. The last of the three credit crunches took place in 1973-74. Disintermediation was somewhat less severe during this episode, thanks to a lengthening in the average maturity of small time and savings deposits at thrifts and the complete removal of deposit rate ceilings on large CD's.

Among institutions, large commercial banks were the least affected by disintermediation because of their ability to tap nondeposit sources of funds. In 1966, large banks were able to make up for their loss of small deposits and large CD's by borrowing Eurodollars from their foreign branches. And, in 1969, they were able to develop new nondeposit sources of funds such as nonbank federal funds, repurchase agreements, and commercial paper issued by their holding companies. During the 1973-74 credit crunch, large banks continued to tap all these sources. By that time, however, the elimination of ceilings on large CD's made such borrowing much less necessary.

S&L's lacked direct access to the open market but were able to borrow indirectly through the Federal Home Loan Bank (FHLB) system. The FHLB sold bonds in the open market and reloaned the proceeds to S&L's at a small markup over its average cost of funds. Borrowing from the FHLB was relatively small in the 1966 credit crunch

⁵ The three credit crunches are discussed in more detail in Patric H. Hendershott and Kevin E. Villani, *Regulation and Reform of the Housing Finance System*, American Enterprise Institute for Public Policy Research, Washington, D.C., 1977, pp. 55-66, and Edward F. McKelvey, "Interest Rate Ceilings and Disintermediation," Staff Economic Studies No. 99, Board of Governors of the Federal Reserve System, 1978. To some extent, banks and thrifts were able to circumvent deposit-rate ceilings by paying their depositors an implicit return in the form of gifts, convenient locations, free checking, and other services priced below cost. However, these implicit interest payments could not be easily increased when market interest rates rose to high levels.

because at that time the FHLB considered itself a lender of last resort. By 1973, however, FHLB advances had become a more significant offset to disintermediation due to a conscious effort on the part of the FHLB to dampen cyclical fluctuations in mortgage lending.

Mutual savings banks and small commercial banks had the most difficulty tapping nondeposit sources of funds during credit crunches. They enjoyed neither the direct access to the open market of large commercial banks nor the indirect access of S&L's through membership in the FHLB.⁶

Impact of deposit deregulation

Although credit crunches were common during the era of binding deposit rate ceilings, it does not follow that the removal of deposit rate ceilings will eliminate credit crunches. In principle, other factors might prevent banks and thrifts from adjusting their deposit rates to changes in open market rates, producing new bouts of disintermediation.

The behavior of thrift deposit inflows before the extension of ceilings to thrifts supports the view that disintermediation can occur even in the absence of ceilings. Thrifts did not become subject to deposit rate ceilings until September 1966. Although there is disagreement about the magnitude of disintermediation in the late 1950s,⁷

there is no doubt that thrifts suffered a sharp reduction in deposit inflows in late 1965 and the first nine months of 1966. Indeed, it was precisely because of these reductions in deposit inflows that the ceilings on commercial banks were reduced and the new ceilings on thrifts set at higher levels.

The behavior of deposit inflows since deregulation is more ambiguous. As shown in Chart 1, the share of new household funds allocated to small time and savings deposits has continued to vary inversely with market rates. The share declined sharply from 1976 to 1981, a period in which market rates were rising, and then recovered strongly from 1981 to 1983, a period in which market rates were falling. However, the sharp drop in deposit inflows from 1976 to 1981 may have occurred because deregulation was still incomplete and because the increase in market interest rates was so steep.⁸ Also, the sharp recovery in deposit inflows in 1982 and 1983 may have had less to do with declining market rates than with the introduction of money market deposit accounts (MMDA's). By enabling banks and thrifts to offer an account fully competitive with shares in money market mutual funds (MMMF's), this change led to a massive one-time shift in funds from MMMF's to MMDA's.

The ideal way to determine if deregulation has made deposit inflows less sensitive to market rates

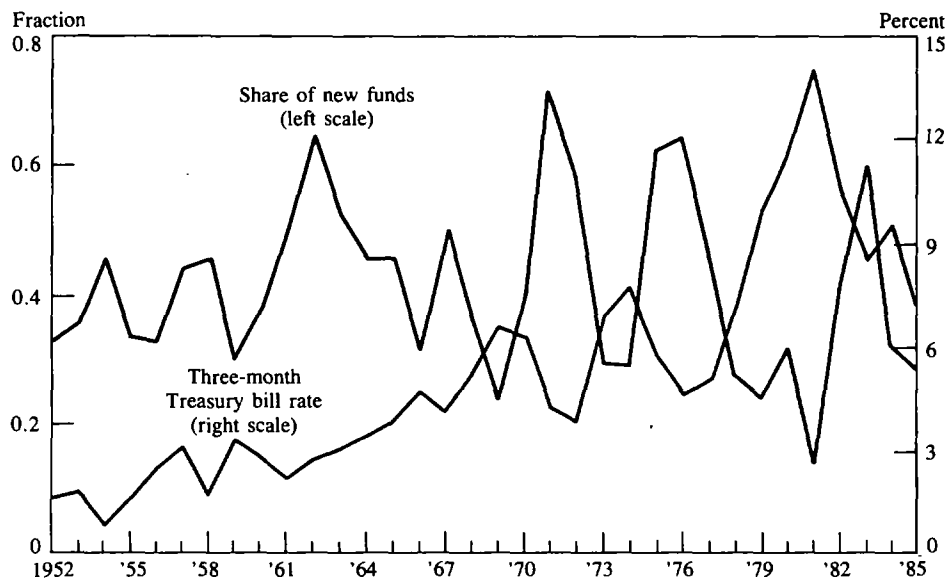
⁶ McKelvey notes that commercial banks with assets under \$50 million suffered relatively little disintermediation in 1973-74, perhaps because their depositors were insensitive to market rates. Thus, despite their lack of access to alternative funds, these banks may not have had to contract their lending as much as some larger banks. See McKelvey, "Interest Rate Ceilings and Disintermediation," 1978, pp. 42-50.

⁷ For the view that thrift disintermediation was a serious problem in the 1950s, see Jack R. Vernon, "Savings and Loan Association Response to Monetary Policies, 1953-61: A Case Study in 'Availability,'" *Southern Economic Journal*, January 1965. The opposing view is expressed in Patric H. Hendershott, "Financial Disintermediation in a Macroeconomic Framework," *Journal of Finance*, September 1971.

⁸ Two studies estimate that the increase in market rates in the late 1970s would have caused an even greater decrease in deposit inflows to thrifts if six-month money market certificates had not been introduced in June 1978. See Dwight M. Jaffee and Kenneth T. Rosen, "Mortgage Credit Availability and Residential Construction," *Brookings Papers on Economic Activity*, 1979:2, pp. 364-365, and A. Thomas King, "Thrift Institution Deposits: The Influence of MMC's and MMMF's," *Journal of Money, Credit, and Banking*, August 1984. Also, a small part of the decline in household acquisition of small time and savings deposits in 1981 may have reflected a one-time shift of household funds into NOW accounts, which are close substitutes for passbook savings accounts but are not counted as savings deposits. See Bryon Higgins and Jon Faust, "NOW's and Super NOW's: Implications for Defining and Measuring Money," *Economic Review*, Federal Reserve Bank of Kansas City, January 1983, pp. 8-11.

CHART 1

Share of new household funds going to small time and savings deposits*



*Net acquisition of small time and savings deposits divided by net acquisition of all financial assets

Source: Flow of Funds, Board of Governors of the Federal Reserve System

would be to estimate the interest elasticity of small time and savings deposits. Unfortunately, the only studies that have taken this approach have focused on the non-M1 component of M2, which lumps small time and savings deposits together with overnight Eurodollars, overnight repurchase agreements, and shares in MMMF's. These studies have found that the non-M1 component of M2 became less sensitive to market rates after 1978.⁹ Although this finding could reflect a decrease in the interest sensitivity of small time and savings deposits, it could also result from the increased importance of Eurodollars, repurchase

agreements, and MMMF shares in M2. Thus, no firm conclusions can be drawn.

A more indirect way of evaluating the impact of deregulation is to observe the behavior of deposit rates without ceilings. Before thrifts were subjected to ceilings, the effective yield on their deposits was highly sluggish, increasing no more than two-tenths of a percentage point during the tight money periods of 1957, 1959, and 1966.¹⁰ Rates on MMDA's and Super-NOW's have been much more flexible. However, they have reacted more slowly to market rates than many observers expected. One study estimates that within the first three months of a change in the six-month Treasury bill rate, the rate on MMDA's changes

⁹ Howard Roth, "Effects of Financial Deregulation on Monetary Policy," *Economic Review*, Federal Reserve Bank of Kansas City, March 1985, p. 24, and John P. Judd and Brian Motley, "The 'Great Velocity Decline' of 1982-83: A Comparative Analysis of M1 and M2," *Economic Review*, Federal Reserve Bank of San Francisco, Summer 1984, pp. 66-68.

¹⁰ Jack Vernon, "Financial Disintermediation in a Macroeconomic Framework: Comment," *Journal of Finance*, September 1973, p. 1030.

only two-thirds as much as the bill rate and the rate on Super-NOW's only one-third as much.¹¹

The sluggishness in deposit rates does not necessarily mean that banks and thrifts will continue to suffer disintermediation in periods of high open market rates. That depends on the cause of the sluggishness. One reason banks and thrifts might fail to match increases in open market rates is that they know it is costly or inconvenient for depositors to switch to other investments. But in that case, deposit rate sluggishness will not be a source of disintermediation. Rather, it will be a symptom of depositors' insensitivity to market rates.

Did banks ration credit?

To determine if credit rationing has played a key role in availability effects, three issues must be addressed. The first is whether it makes any sense for banks and thrifts to allocate credit by nonprice terms. The second is whether there is any empirical evidence of credit rationing. And last is whether the removal of deposit rate ceilings will cause credit rationing to disappear.

Causes of credit rationing

In general, credit rationing can be said to occur when banks refuse to lend to borrowers who are identical to their other customers or when banks establish nonprice requirements that disqualify borrowers who would have been willing to pay higher loan rates in order to receive credit. The central question that any theory of rationing must answer is this: why do banks not accommodate these unsatisfied borrowers at a higher interest rate instead of rejecting them altogether? Several theories have been proposed to answer this ques-

tion. Some of these theories help explain why monetary policy would have strong availability effects. Others do not.

The first and most obvious explanation of credit rationing is usury ceilings, or legal limits on the loan rates that banks and thrifts can charge. Until recently, many states had ceilings on mortgage rates. In periods of high market rates, these ceilings became binding and thrifts compensated by tightening their nonprice requirements.¹²

A second explanation of credit rationing is that there are significant costs of adjusting loan rates, costs that can be reduced only by spreading the adjustment over a long period. According to this view, adjustment costs delay the response of loan rates to increases in open market rates, causing banks to temporarily tighten their nonprice requirements. Although this is one of the most com-

The central question that any theory of rationing must answer is why banks do not accommodate borrowers at a higher interest rate.

mon explanations given for credit rationing, it is also the least satisfactory, simply because the costs of adjustment are rarely made explicit.

A third explanation of credit rationing is based on the asymmetry of information between banks and borrowers. A bank usually has much less information about the inherent risk of a borrower or the amount of risk the borrower is taking than the borrower himself. As a result of this asymmetry in information, a rise in loan rates can affect borrowers' behavior in ways that increase the likelihood of default and decrease banks' expected rate of return. For example, an increase in loan rates may induce some borrowers to gamble on riskier investment projects—the problem of

¹¹ Paul F. O'Brien, "Deregulated Deposit Rate Behavior," unpublished paper, Division of Research and Statistics, Board of Governors of the Federal Reserve System, April 1986, p. 6.

¹² See James Ostas, "Effects of Usury Ceilings in the Mortgage Market," *Journal of Finance*, June 1976.

"moral hazard." Or, an increase in loan rates may induce a higher proportion of safe borrowers to drop out of the market than of risky borrowers—the problem of "adverse selection." In either case, banks may be unwilling to raise their loan rates beyond some maximum level when open market rates go up, even if this means denying credit to borrowers who would be willing to pay more than the maximum rate to receive a loan.¹³

Another explanation of credit rationing emphasizes the optimal sharing of risks through "implicit contracts." According to this theory, banks are more willing to bear the risk of interest rate fluctuations than borrowers. As a result, banks and their customers enter informal agreements that guarantee stable loans but allow the bank to deny credit to a predetermined fraction of customers when market interest rates are high.¹⁴ This theory can explain why credit would be rationed in periods of tight money, but in contrast to other theories, it cannot explain why monetary policy would have strong availability effects. If there were no implicit contracts guaranteeing stable loan rates, just as many borrowers would fail to receive credit in periods of tight money. The only difference would be that these borrowers would go without credit voluntarily, discouraged by high loan rates.¹⁵

The next explanation of credit rationing is based on the observation that banks often charge a

uniform loan rate to borrowers they know to have different risk or different value as long-term customers. To some extent, a bank must base its evaluation of borrowers on subjective factors that cannot be independently verified. But a bank that tries to differentiate between borrowers on this basis may have difficulty attracting and keeping loan customers. To establish a reputation for fairness, the bank may prefer to charge a uniform rate within broad classes of heterogeneous borrowers, fully accommodating the demand of the most preferred borrowers in each class but rationing credit to the least preferred members.¹⁶ As in the case of optimal risk-sharing, though, this type of credit rationing need not enhance the availability effects of monetary policy. Because nothing will prevent banks from raising their loan rates when market rates go up, credit rationing could just as well decrease in periods of tight money as increase.

Although neither the risk-sharing theory nor the uniform rate theory explains the type of credit rationing that would contribute to availability effects, together the two theories can explain such rationing. A bank might want to charge a uniform rate to assure its customers of equitable treatment and at the same time keep the rate stable so customers do not have to bear the risk of interest rate fluctuations. Charging a uniform loan rate may cause the bank to ration its least-preferred customers even in periods of easy money. However, the commitment to a stable loan rate will cause these borrowers to be rationed to an even greater degree when money is tight, enhancing availability effects.

¹³ This explanation of credit rationing is developed in William R. Keeton, *Equilibrium Credit Rationing*, Garland, N.Y., 1979, ch. 3, and Joseph Stiglitz and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, June 1981.

¹⁴ The risk-sharing theory was first proposed as an explanation for labor unemployment. The extension to credit markets is in Joel Fried and Peter Howitt, "Credit Rationing and Implicit Contract Theory," *Journal of Money, Credit, and Banking*, August 1980.

¹⁵ For the same reason, it is now recognized that risk-sharing labor contracts do not necessarily lead to Keynesian fluctuations in labor unemployment. See Sherwin Rosen, "Implicit Contracts: A Survey," *Journal of Economic Literature*, September 1985, especially pp. 1154-1155.

¹⁶ The proposition that a bank would ration its riskiest customers if constrained to charge all customers the same rate was first proved in Dwight M. Jaffee and Franco Modigliani, "A Theory and Test of Credit Rationing," *American Economic Review*, December 1969. Alex Cukierman extended the theory to borrowers who differ in their propensity to hold deposits and consume other bank services in "The Horizontal Integration of the Banking Firm, Credit Rationing, and Monetary Policy," *Review of Economic Studies*, February 1978.

Empirical evidence on the existence of rationing

Researchers have tried to test for credit rationing in two ways—by determining if loan rates are sticky and by examining the behavior of nonprice lending terms.

Evidence on loan rate behavior. Most studies of loan rate behavior assume that stickiness in loan rates reflects temporary disequilibrium. According to this view, loan rates adjust only gradually to their long-run equilibrium level, either because there are costs to banks of making rapid rate changes or because banks have made implicit contracts to protect their borrowers from changes in market rates that are perceived as temporary. Typically, studies of this kind estimate a loan rate equation that includes as explanatory variables both the previous period's loan rate and a set of exogenous variables believed to affect the equilibrium loan rate through their influence on the supply of and the demand for credit. The greater the influence of the previous period's loan rate, the slower is the estimated speed of adjustment.

Disequilibrium loan rate studies generally find that loan rates have not responded immediately to changes in demand or supply conditions. However, the estimated speed of adjustment is higher for recent sample periods than for early sample periods, suggesting that loan rates were becoming less sluggish even before deposit deregulation. Also, mortgage rate studies generally estimate lower speeds of adjustment than commercial loan rate studies, most of which focus on loan rates charged by large banks.¹⁷

A second group of loan rate studies tests for a different kind of loan rate stickiness—the stickiness that can result from banks setting their loan rates as a markup over their average cost of funds. If banks' average cost of funds does not respond quickly to market rates, average-cost pricing will tend to slow the adjustment of loan rates. Many

economists view such pricing behavior as irrational, but it may simply be a convenient way for banks and borrowers to share the risk of interest rate fluctuations.

Empirical evidence on average-cost pricing is mixed. Controlling for market rates and other factors, Jaffee and Rosen found that the average cost of funds to S&L's was positively related to the S&L mortgage rate. However, skeptics argued that their result was due to faulty methodology. When different versions of their basic equation were estimated, opposite results were sometimes obtained.¹⁸ Small commercial banks have also been alleged to use average-cost pricing, but most of the evidence in support of this claim is highly casual. Time plots such as Chart 2 indicate that small banks' average cost of funds and average rate of return on loans both responded very little to open market rates before 1978 but both began moving much more closely with open market rates after that.¹⁹

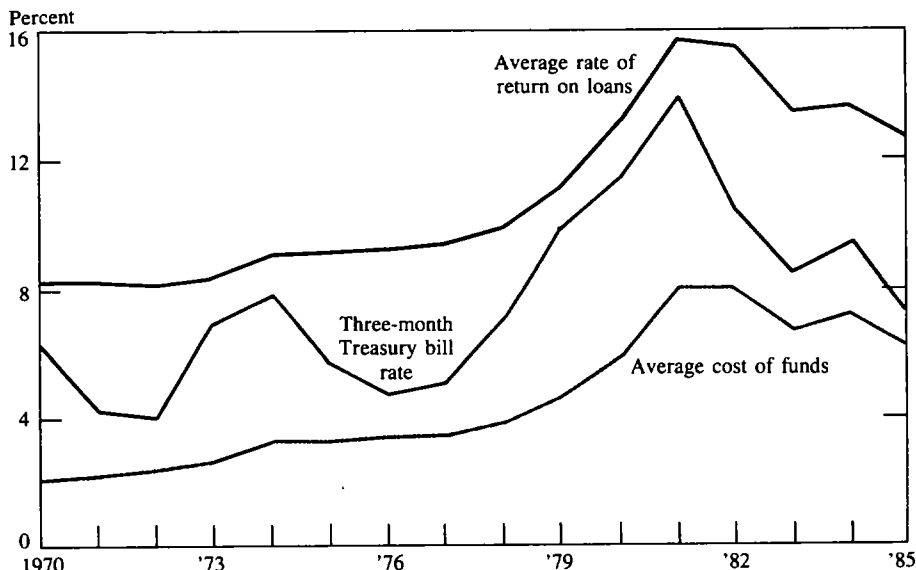
In evaluating loan rate studies, it is important to remember that stickiness in loan rates is a necessary condition for the existence of credit rationing but not a sufficient condition. When the loan rate is below the equilibrium level, banks and thrifts may choose to accommodate their

¹⁷ Jaffee and Rosen estimated that 57 percent of the gap between the actual mortgage rate and the equilibrium rate was eliminated within one quarter. For commercial loan rates, recent estimates range from 63 percent per quarter by Sealey to 87 percent per quarter by Ito and Ueda. See Jaffee and Rosen, "Mortgage Credit Availability and Residential Construction," 1979; C.W. Sealey, Jr., "Credit Rationing in the Commercial Loan Market: Estimates of a Structural Model Under Conditions of Disequilibrium," *Journal of Finance*, June 1979; and Takatoshi Ito and Kazuo Ueda, "Tests of the Equilibrium Hypothesis in Disequilibrium Econometrics: An International Comparison of Credit Rationing," *International Economic Review*, October 1981.

¹⁸ See Jaffee and Rosen, "Mortgage Credit Availability and Residential Construction," 1979; David H. Pyle, "Deposit Costs and Mortgage Rates," *Housing Finance Review*, January 1982; and Thomas A. King, "The Deposit Rate and the Mortgage Rate: Does Regulation Q Promote Homeownership?" Research Working Paper No. 85, Office of Policy and Economic Research, Federal Home Loan Bank Board, September 1979.

CHART 2

**Average return on loans versus average cost of funds,
small Tenth District banks***



*Small banks are defined as those with less than \$300 million of assets in 1985.

Source: Reports of Condition and Income

customers' loan demand, extending more credit than they would prefer on the basis of short-run profit maximization. For that reason, evidence on the stickiness of loan rates cannot prove that banks rationed credit.

Evidence on nonprice terms. If banks use non-price terms to ration credit, they should be observed to tighten these terms in periods of tight money or strong credit demand. Also, as nonprice terms are tightened, borrowers' effective demand for credit should fall.

¹⁹ Similar evidence is presented in Thomas D. Simpson and Patrick M. Parkinson, "Some Implications of Financial Innovation in the United States," Staff Studies No. 139, Board of Governors of the Federal Reserve System, September 1984. For agricultural banks, there is more direct evidence of average-cost pricing in a recent survey of lending practices by Peter J. Barry and Jeffrey D. Calvert. See their "Loan Pricing and Profitability Analysis by Agricultural Banks," *Agricultural Finance Review*, 1983.

Several studies have found that nonprice terms do become more favorable to lenders in periods of tight money or rising loan rates. Jaffee and Modigliani argued that the percentage of commercial bank loans made at the prime rate could be used as a proxy for the average creditworthiness of borrowers because prime-rate customers were the least risky.²⁰ Controlling for the average loan rate, they found that the percentage of prime loans tended to rise when market rates were high or deposits unavailable, leading them to conclude that banks tightened credit standards in periods of tight money. Rudolph and Zumpano obtained similar results for the mortgage market, using average maturity, average loan size, and the average downpayment ratio as measures of nonprice

²⁰ Jaffee and Modigliani, "A Theory and Test of Credit Rationing," 1969.

terms.²¹ Finally, using data from the Federal Reserve's Senior Loan Officer Survey, Harris found that large commercial banks tended to tighten their credit standards at the same time they raised their loan rates. This finding suggested that banks used both measures to allocate credit when funds were scarce.²²

Studies of the mortgage and housing markets have found that tighter nonprice terms have a strong negative effect on demand. Ostas and Zahn estimated a simultaneous-equation model of the S&L mortgage market and found that increases in the average downpayment ratio tended to reduce mortgage demand.²³ Similarly, Kent found that increases in the average maturity of loans tended to raise mortgage demand.²⁴ Finally, numerous studies of housing investment have concluded that increases in average downpayment ratios tend to reduce the rate of starts.²⁵

Unfortunately, most studies of nonprice lending terms are subject to a serious flaw. Except for Harris' work using survey responses, all the studies assume that banks' nonprice requirements can be measured by the average value of such nonprice

characteristics as the quality of the borrower, the size of the downpayment, or the term to maturity. The implicit assumption is that if the average value of these characteristics changes in a direction favorable to banks, it is because banks have raised their minimum requirements. However, the average may change for an entirely different reason—because changes in open market rates or other market conditions cause borrowers to prefer a different set of nonprice characteristics. From the data, the two possibilities cannot be distinguished.²⁶

Impact of deposit deregulation on credit rationing

It is important to know if deposit rate ceilings were responsible in any way for credit rationing. If ceilings were not responsible, credit may continue to be rationed during periods of tight money and availability effects may remain important. But if ceilings were responsible, credit rationing will diminish as a result of deposit deregulation and the reduction in availability effects will be that much greater.

The only explanation of credit rationing in which deposit rate ceilings play a role is the one based on optimal sharing of risks.²⁷ Before

²¹ Patricia M. Rudolph and Leonard V. Zumpano, "A Test of the Equilibrium Credit Rationing Hypothesis," *Housing Finance Review*, October 1982.

²² Duane G. Harris, "Some Evidence on Differential Lending Practices at Commercial Banks," *Journal of Finance*, December 1973, and "Interest Rates, Nonprice Terms and the Allocation of Bank Credit," *Southern Economic Journal*, January 1974.

²³ James R. Ostas and Frank Zahn, "Interest and Non-Interest Credit Rationing in the Mortgage Market," *Journal of Monetary Economics*, April 1975.

²⁴ Richard J. Kent, "Credit Rationing and the Home Mortgage Market," *Journal of Money, Credit, and Banking*, August 1980.

²⁵ These studies are surveyed in James Kearl, Kenneth Rosen, and Craig Swan, "Relationships Between the Mortgage Instruments, the Demand for Housing and Mortgage Credit: A Review of Empirical Studies," *New Mortgage Designs for Stable Housing in an Inflationary Environment*, Federal Reserve Bank of Boston, Conference Series No. 14, 1975. Because the studies focus on housing starts rather than mortgage demand, they can also be viewed as tests of the nonfungibility of mortgage credit.

²⁶ Muth pointed out that average downpayment ratios could rise at the same time market rates were going up, not because lenders were raising their minimum downpayment ratios, but rather, because borrowers who preferred relatively low downpayment ratios were choosing to forego home purchases. See Richard F. Muth, "Interest Rates, Contract Terms, and the Allocation of Mortgage Funds," *Journal of Finance*, March 1962. The same point was made about Jaffee and Modigliani's use of the percentage of prime loans to measure bank credit standards in Peter A. Frost, "Book Reviews," *Journal of Political Economy*, November/December 1973.

²⁷ Because usury ceilings have been relaxed over the last several years, deposit deregulation has probably been accompanied by a significant decline in rationing from that source. However, this is quite different from saying that deposit deregulation caused the decline in credit rationing.

deregulation, thrifts and small commercial banks may have been willing to offer stable loan rates to their customers because a large percentage of their funds were small deposits subject to rate ceilings. This reliance on small regulated deposits tended to protect their average cost of funds from fluctuations in market interest rates, making it more efficient for them to bear the risk of those fluctuations than their borrowers. Now that ceilings have been removed, the average cost of funds to thrifts and small commercial banks responds much more quickly to changes in market rates (Chart 2). This change should make them less willing to assume the risk of interest rate fluctuations and, therefore, less willing to offer stable rates.

It is unclear whether the refusal of banks to assume the risk of interest rate fluctuations will make them more willing to maintain their lending in periods of tight money. Banks offering loan rates that are stable but nonuniform will not reduce their lending any more in periods of tight money than banks with variable loan rates. Thus, a greater reluctance on the part of banks to offer stable loan rates need not reduce the importance of availability effects. However, to establish a reputation for fairness, banks may have offered rates that were not only stable over time but uniform across customers. To the extent that banks did behave this way, deposit deregulation may reduce the contribution of credit rationing to availability effects.

Although none of the empirical studies of credit rationing have tried to determine if rationing has become less important with deregulation, Chart 3 provides some tentative evidence that it has. The upper panel of the chart shows the fraction of banks in the Federal Reserve's Senior Loan Officer Survey that said they had tightened credit standards for new borrowers minus the fraction that said they had eased them. The lower panel shows the change in the average short-term loan rate at another sample of large banks. As Harris noted, changes in credit standards tend to mirror changes

in loan rates. Since 1978, however, fluctuations in credit standards have narrowed while fluctuations in loan rates have widened. This shift suggests that banks may now be relying more on loan rates to allocate credit and less on nonprice terms.

Is credit fungible?

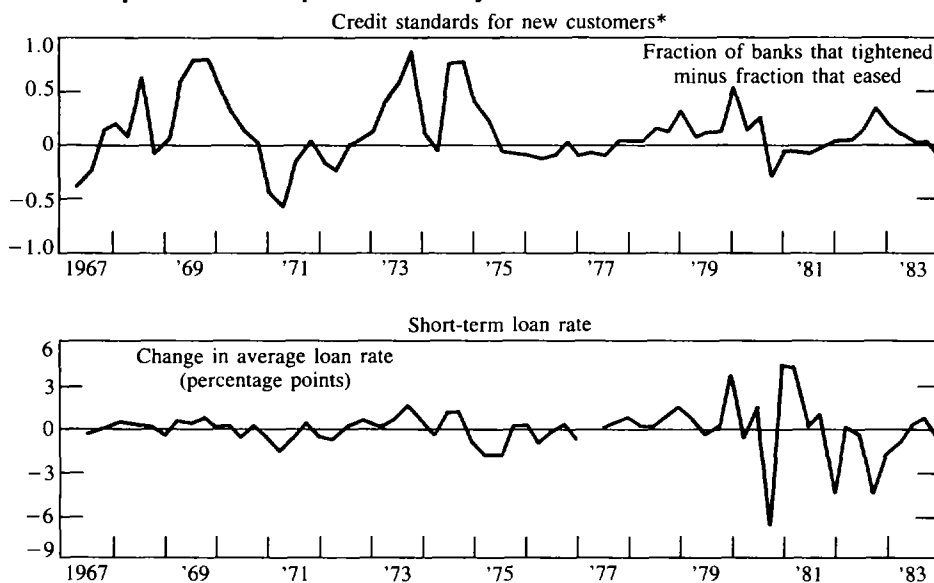
Whether credit is allocated by price or nonprice means, disintermediation should reduce lending by banks and thrifts. It does not follow, however, that private spending will be reduced by the same amount. Some of the borrowers deprived of bank loans may be able to finance their spending in other ways. The greater the extent to which such substitution occurs, the less tendency there will be for availability effects to enhance the effectiveness of monetary policy.

In the case of mortgages, an important source of fungibility is the existence of a secondary market where mortgage loans can be resold to private investors. The federal housing credit agencies have played a key role in fostering this market, both by buying mortgages with funds borrowed in the open market and by providing guarantees that make it easier for private parties to sell shares in mortgage pools.²⁸ Even before deposit deregulation, the growth in the secondary market had helped reduce the impact of disintermediation on housing investment by enabling thrifts to continue originating mortgages for resale and by enabling homebuyers to obtain financing from mortgage bankers as well as thrifts. In other words, the secondary market made it easier for homebuyers

²⁸ The two agencies that buy mortgage loans directly are FHLMC ("Freddie Mac") and FNMA ("Fannie Mae"). Freddie Mac finances its purchases by issuing pass-through securities backed by mortgage pools, while Fannie Mae finances its purchases both by issuing pass-through securities and by selling its own debt. GNMA ("Ginnie Mae") promotes the secondary market indirectly, by guaranteeing certain kinds of privately issued mortgage-backed securities.

CHART 3

Relative use of price and nonprice terms by commercial banks



*The change in credit standards is for new customers only through the first quarter of 1981 and for both new and nonlocal customers after that.

Source: Senior Loan Officer Opinion Survey on Bank Lending Practices and Quarterly Survey of Terms of Bank Lending, Board of Governors of the Federal Reserve System

to substitute funds borrowed in the open market for funds borrowed from thrifts.

Although there is still not a well developed secondary market for commercial bank loans, some businesses have had access to other forms of financing not available to homebuyers. Large, well established firms have always been able to raise funds directly by selling commercial paper or corporate bonds to private investors. Growth in the commercial paper market was especially rapid in the 1970s, making it relatively easy for most large firms to maintain spending in periods of reduced bank credit. Because they are not well known by investors, small firms have more difficulty borrowing in the open market. In some cases, small firms that are denied bank credit may be able to substitute trade credit from larger firms that act as their suppliers. But because the effective cost of trade credit can be significantly greater

than the cost of bank borrowing, reductions in bank credit are likely to have more effect on the spending plans of small firms than of large firms.²⁹

Almost all of the empirical evidence on fungibility is concerned with the impact of mortgage availability on housing investment. A common approach to this question is to estimate an equation for housing investment that includes the supply of thrift deposits or mortgage funds as one

²⁹ In the last several years, large money center banks have begun selling some of their commercial loans. However, most of the loans are to large firms that already enjoy access to the commercial paper market and most of the loans are sold to other banks rather than to private investors. A broad secondary market seems more likely to develop for auto loans because these loans are well collateralized and can be pooled into pass-through securities with highly predictable cash flows. See Charles A. Luckett, "Recent Developments in Automobile Finance," *Federal Reserve Bulletin*, June 1986, pp. 363-364.

of the explanatory variables. Most studies that have taken this approach have concluded that mortgage credit is not perfectly fungible, but a few studies have reached the opposite conclusion.

The most widely cited study confirming the importance of mortgage availability is the one by Jaffee and Rosen noted earlier. In this study, housing starts were explained by an equation that included demographic variables, the mortgage rate, and two measures of mortgage availability—the change in deposits at thrift institutions and the amount of FHLB advances and new mortgage commitments by the federal credit agencies. The two availability measures were found to have a strong positive effect on starts, suggesting both that thrifts rationed credit and that credit was non-fungible.³⁰

The importance of mortgage availability was strongly denied in studies by Arcelus and Meltzer and by DeRosa. They argued that the correlation typically observed between mortgage availability and housing starts was coincidental—mortgage availability was positively related to housing starts only because high open market rates simultaneously decreased thrift deposits and reduced housing demand. To resolve this problem, Arcelus and Meltzer substituted open market interest rates for mortgage rates in the equation for housing starts. They found that housing starts were stimulated by declines in open market interest rates but not by increases in availability, suggesting that mortgage credit was highly fungible.³¹ DeRosa took

a different approach. If mortgage credit is non-fungible, credit rationing should reduce the rate at which households are able to adjust their actual holdings of houses toward ideal levels. DeRosa found that this rate of adjustment was no lower in credit crunches than in normal times, suggesting either that credit rationing did not intensify in credit crunches or that mortgage credit was fungible.³²

Although the results of Arcelus and Meltzer and DeRosa cast some doubt on the link between mortgage availability and housing investment, availability could affect private spending in another way. One reason changes in mortgage availability might have little effect on housing investment is that households use mortgage credit to replace other forms of borrowing or to build up their liquid assets. Another possibility, however, is that households use mortgage credit to increase their consumption spending. During the housing inflation of the late 1970s, for example, households borrowed heavily against the increased equity in their homes and used much of the borrowed funds to finance increased consumption.³³ Thus, changes in mortgage availability could have a significant effect on total private spending, even if housing did not always bear the main burden of the impact.

Conclusions

The argument is sometimes made that deposit rate deregulation will weaken monetary policy and raise the general level of interest rates by reducing credit availability effects. Economists who take this position base their argument on three

³⁰ Jaffee and Rosen, "Mortgage Credit Availability and Residential Construction," 1979. Using a different measure of borrowing costs that allowed for taxes and inflation, Hendershott found a somewhat smaller relationship than Jaffee and Rosen. See Patric H. Hendershott, "Real User Costs and the Demand for Single-Family Housing," *Brookings Papers on Economic Activity*, 1980:2.

³¹ Francisco Arcelus and Allan H. Meltzer, "The Markets for Housing and Housing Services," *Journal of Money, Credit, and Banking*, February 1973, Part I. For a critique of Arcelus and Meltzer's methodology and conclusions, see Craig Swan, "Comment," *Journal of Money, Credit, and Banking*, November 1973.

³² Paul DeRosa, "Mortgage Rationing and Residential Investment: Some Results from a Brainard-Tobin Model," *Journal of Money, Credit, and Banking*, February 1978.

³³ See David F. Seiders, "Mortgage Borrowing Against Equity in Existing Homes: Measurement, Generation, and Implications for Economic Activity," Staff Economic Studies No. 96, Board of Governors of the Federal Reserve System, 1978.

assertions—deposit rate ceilings helped reduce the supply of bank and thrift credit during periods of tight money by increasing disintermediation; the impact of disintermediation on bank and thrift lending was reinforced by nonprice credit rationing; and finally, borrowers were unable to finance their spending in other ways when bank and thrift lending fell. This article has critically evaluated each of these three key links in the credit availability argument.

Deposit rate ceilings did lead to significant disintermediation during periods of tight money, but this disintermediation had much more effect on lending by thrifts and small commercial banks than on lending by large banks. The impact of disintermediation fell most heavily on thrifts and small commercial banks because these institutions depended on small deposits as a source of funds. Large commercial banks had greater access to nondeposit funds and large unregulated deposits and were thus better able to maintain their lending when inflows of small deposits fell. Now that ceilings have been removed, disintermediation of small deposits should become much less important even if deposit rates respond sluggishly to changes in open market rates. This reduction in disintermediation will help stabilize the supply of credit from thrifts and small commercial banks but will affect only the mix of funds at large commercial banks.

Credit rationing may have reinforced the impact of disintermediation on bank and thrift lending while ceilings were in place, but it is difficult to say how large this effect was or whether rationing will continue to be a factor now that ceilings have been removed. Although many theories have been offered to explain why banks and thrifts might ration credit by nonprice means, only some of the theories imply that credit rationing would strengthen monetary policy and all of the theories

have proven difficult to test empirically. Surveys of bank credit standards suggest that banks may now be relying less on nonprice terms to allocate credit and more on loan rates. In principle, deposit deregulation could have caused such a change in lending practices by making banks and thrifts less willing to offer stable loan rates that protect their customers from interest rate risk. But more evidence is needed to determine if credit rationing has truly declined, and if so, why.

Finally, although some borrowers were forced to reduce their spending when bank and thrift lending fell, long-term changes in financial markets were gradually increasing the fungibility of credit, weakening the link between credit availability and private spending. The impact of mortgage availability on housing investment has long been a subject of heated debate among economists. But no matter how important mortgage availability once was, the rapid growth of the secondary mortgage market in the 1970s clearly made household spending less dependent on mortgage funds borrowed from thrifts. Equally important, the expansion in the commercial paper market allowed increasing numbers of businesses to bypass commercial banks and borrow directly in the open market. Thus, even before deposit deregulation began, the availability effects of monetary policy had been considerably weakened.

On balance, the theoretical and empirical evidence suggests that deposit deregulation will reduce availability effects but will not reduce them enough to significantly weaken monetary policy. With deposit rate ceilings removed, open market interest rates may have to rise somewhat higher to restrain the economy in periods of strong demand. But the level of interest rates will depend much more on other factors, such as the profitability of investment and the magnitude of public and private saving.

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