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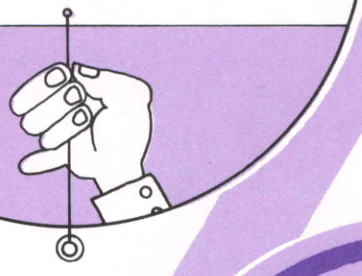
by Herb Taylor (p. 3)



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by Brian C. Gendreau (p. 13)

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Federal Reserve Bank of Philadelphia
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Herb Taylor

The role of the discount window in the Fed's money control strategy is a topic of continuous debate. Recommendations for interest rates at the window run the gamut from a penalty rate to a subsidy rate. Now that the Fed is using open market operations to target reserves, and is instituting new reserve accounting procedures, how should the discount rate be set to improve the Fed's control over the money stock? The answer depends on how well the Fed is able to predict the public's demand for money and the financial system's willingness and ability to supply it.

WHEN IS THE PRIME RATE SECOND CHOICE?

Brian C. Gendreau

Large banks are making many loans at below-prime rates. At the same time, banks are changing the prime faster in response to market interest rate movements. Both these changes can be traced to shifts in the sources of banks' lendable funds. As interest rates became more volatile in recent years, banks were forced to rely increasingly on liabilities paying market rates of interest, and to charge rates on loans that were closer to rates on money market instruments.

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The Federal Reserve Bank of Philadelphia is part of the Federal Reserve System—a System which includes twelve regional banks located around the nation as well as the Board of Governors in Washington. The Federal Reserve System was established by Congress in 1913 primarily to manage the nation's monetary affairs. Supporting functions include clearing checks, providing coin and currency to the banking system, acting as banker for the Federal government, supervising commercial banks, and enforcing consumer credit protection laws. In keeping with the Federal Reserve Act, the System is an agency of the Congress, independent administratively of the Executive Branch, and insulated from partisan political pressures. The Federal Reserve is self-supporting and regularly makes payments to the United States Treasury from its operating surpluses.

The Discount Window and Money Control

by Herb Taylor *

Concerned about the inflationary pressures that rapid money growth can create, the Federal Reserve has been moving to improve its control over the nation's money stock in recent years. In October 1979, the Fed began using its open market operations to control more closely the supply of bank reserves—the raw material banks need to create money. Recently, the Fed's Board of Governors voted to adopt a system of contemporaneous reserve requirements that will strengthen the link between reserves and money. The new system of reserve requirement accounting is scheduled for implementation early in 1984, and once in place, two of the Fed's major policy tools—open market operations and reserve requirements—will have been reworked to produce better money control. Is an overhaul of the Fed's third policy tool—the discount window—the next logical step? Perhaps so.

In addition to supplying reserves to the financial system through open market operations, the Fed also lends reserves to banks at its discount window. The Fed generally has set the discount rate, the interest rate on borrowed reserves, somewhat below short-term market interest rates, and has relied on an established set of lending practices to limit the amount banks borrow at the discount window.

Before the Fed's October 1979 switch to a reserve-oriented procedure for open market operations, its handling of the discount window had little impact on the Fed's ability to control the money stock. Now, with the Fed following the reserve operating procedure, but contemporaneous reserve requirements not yet implemented, the Fed's current approach to discount window administration actually enhances short-run money control. Many argue that, once contemporaneous

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reserve requirements are instituted next year, this approach should be abandoned because it will compromise the Fed's control over the stock of money. They recommend the Fed reduce banks' incentives to borrow reserves at the discount window by setting the discount rate well above short-term market interest rates. But the case for going to a so-called penalty discount rate is not clear-cut. To assess whether a change in the discount window procedure would be appropriate, we must take a closer look at how the discount window fits into the Fed's evolving money control strategy.

CONTROLLING THE STOCK OF MONEY BY CONTROLLING THE SUPPLY OF RESERVES

The Fed's narrowest definition of money, M1, includes both currency in circulation and the balances the public holds in transactions accounts at depository financial institutions (commercial banks, mutual savings banks, savings and loans, and credit unions). These institutions are required by law to hold reserves in proportion to the balances in the transactions accounts they issue.[1] They also provide currency when people decide to withdraw funds from their accounts; to make such transfers, institutions "buy" currency from the Fed with their reserves. So, when the Fed changes the amount of reserves it supplies to the financial system, it changes the amount of money—currency and transactions balances—that the financial system is *able* to supply to the public.

This does not mean that the Fed can tell exactly how much the quantity of money *will* change when it changes the supply of reserves. The outcome will depend on exactly how financial institutions and the public react to the change in reserves—in other words, on supply and demand factors. Based on previous experience and an assessment of current economic and financial conditions, the Fed can *predict* how much the quantity of money is likely to change when it adds reserves to, or withdraws reserves from, the financial system. But in the short run, at least, the actual outcome is likely to differ somewhat from the Fed's expectation.

Controlling the Supply of Reserves Through Open Market Operations. The Fed affects the supply of reserves primarily through its open market operations, that is, its purchases and sales of U.S. Government securities. On average only about 3 percent of the total reserves held by depository institutions are borrowed from the Fed at the discount window. The other 97 percent are nonborrowed reserves which the Fed has provided through open market purchases of government securities.[2] The Fed's open market operations can substantially influence short-term market interest rates as well, especially the federal funds rate—the rate at which banks lend reserves to one another overnight.

Each February, the Federal Open Market Committee (FOMC)—the principal group within the Fed charged with setting monetary policy—announces target ranges for growth in M1 and several broader measures of the money supply over the course of the year. At regular intervals, the FOMC meets to assess the performance of the monetary aggregates relative to these ranges. If money growth has deviated substantially from the long-term targets, the FOMC typically determines a short-run strategy for returning money to those targets. Under the pre-1979 federal funds rate operating procedure, the FOMC used open market operations to adjust the federal funds rate to a level thought to be consistent with returning to its money growth targets. Under the reserve operating procedure, the FOMC now uses open market operations to adjust the amount of reserves to a level which the Fed staff estimates to be consistent with the desired behavior of money growth.[3]

[1] Transactions accounts in M1 include checking accounts at commercial banks and mutual savings banks, NOW and ATS accounts at these institutions and at savings and loans, and share draft accounts at credit unions. The definition of M1 is given in Table 1.21 of the Financial and Business Statistics Section of each issue of the *Federal Reserve Bulletin*.

Depository institutions may hold reserves either as deposits at the Federal Reserve Bank or as cash in their vaults.

[2] When the Fed buys U.S. Government securities, the supply of reserves available to the banking system rises. The Fed pays brokers for the securities it purchases with checks drawn on the Fed; the brokers deposit the checks with their banks; the banks present the checks to the Fed for payment; and the Fed makes payment by crediting the banks' reserve accounts in the amount of the check. When the Fed sells securities, bank reserves fall.

[3] For a more detailed discussion of the Fed's switch to a reserves operating procedure and the impact of this change on money growth and interest rate behavior, see "The FOMC in

If the staff's estimates of banks' willingness to supply money and of the public's willingness to hold money (rather than other forms of assets) were correct, the changes in reserves would work their way through the financial system, expanding or contracting the money stock by just enough to achieve the FOMC's money growth target. But the staff's estimates are always subject to some error. So the supply of nonborrowed reserves that the Fed makes available may not keep money growth exactly on target. How far off target the money stock ends up depends not only on how large an unexpected shift occurred in the behavior of financial institutions or the general public, but also on how the Fed has deployed its other monetary policy tools—reserve requirements and the discount window.

Contemporaneous Reserve Requirements Will Strengthen the Link Between Reserves and Money. In September 1982, the Board of Governors approved a switch to contemporaneous reserve accounting in order to strengthen the relationship between the amount of reserves the Fed supplies and the amount of money the financial system creates.

The textbook version of the money supply process suggests that a bank's reserve requirements are based on the balances *currently* outstanding in its customers' transactions accounts. But since 1968, the Fed has been using a system of lagged reserve requirements (LRR). Under this system, banks meet their reserve requirements by maintaining a specified average reserve balance with the Fed each week computed on the basis of the average level of transactions balances held at the bank two weeks previous. Therefore, the level of transactions deposits outstanding in the current week does not affect banks' required reserves until two weeks in the future. Under LRR, if the public's demand for transactions balances is exceptionally strong in the current week, depository institutions can meet the higher demand without any immediate increase in their current week's required reserves. (See THE DISCOUNT WINDOW AND MONEY CONTROL UNDER LRR, p. 6.)

Under the contemporaneous reserve requirements (CRR) system scheduled for implementation in February 1984, depository institutions will face two-week settlement periods ending with the close of business every other Wednesday. But their reserve requirements for each settlement period will depend on the amount currently outstanding in their customers' transactions accounts.[4] So the average volume of transactions accounts that the depository institutions can support during any settlement period will depend directly on the amount of reserves the Fed is willing to supply over that period.[5]

CRR will strengthen the link between required reserves and the volume of transactions balances, but it will not forge an ironclad bond between the

1979: Introducing Reserve Targeting," by Richard W. Lang in the Federal Reserve Bank of St. Louis *Review,* (March 1980), pp. 2-25, and "The FOMC in 1980: A Year of Reserve Targeting," by R. Alton Gilbert and Michael E. Trebing in the Federal Reserve Bank of St. Louis *Review,* (August/September 1981), pp. 2-22. Also see "Federal Reserve System Implementation of Monetary Policy: Analytical Foundations of the New Approach," by Stephen Axilrod and David E. Lindsey in the *American Economic Review,* Papers and Proceedings vol. 17 (May 1981), pp. 246-252.

[4]In particular, an institution's reserve requirements are computed on the basis of its average level of deposits for the two-week period beginning with the opening of business the Monday before the settlement period begins, and ending with the close of business on the Monday before the settlement period closes. Except for a two-day lag, then, an institution's current reserve requirements will depend upon its current deposit level. For a detailed discussion of the new CRR system see "The New System of Contemporaneous Reserve Requirements," by R. Alton Gilbert and Michael E. Trebing in the Federal Reserve Bank of St. Louis *Review,* (December 1982), pp. 3-7.

[5]From the perspective of money control, a weakness of the current reserve requirement structure is that not all depository institutions are required to hold reserves in the same proportion to their outstanding transactions deposits. In addition, certain types of time and savings deposits, which are not part of the narrowly defined money supply, are subject to reserve requirements. Consequently, the public's choices of which particular depository institutions they will use and of how much to hold in various non-transactions type accounts affect the amount of reserves the financial system will require to support a particular volume of transactions balances.

After an eight-year phase-in period, the Depository Institution Deregulation and Monetary Control Act of 1980 (MCA) will bring the Fed closer to a uniform set of reserve requirements on all transactions balances included in M1, although some differences among depository institutions and types of deposits will remain. For a detailed presentation of these requirements and of the reserve requirements prior to MCA see Table 1.15 in the Financial and Business Statistics section of any recent issue of the *Federal Reserve Bulletin.*

THE DISCOUNT WINDOW AND MONEY CONTROL UNDER LRR

Lagged reserve requirements (LRR) weaken the short-run relationship between money and reserves. As long as LRR remains in place, the only immediate impact open market operations have on the money stock is through their impact on the federal funds rate. Under these circumstances, combining a penalty discount rate with a reserve targeting procedure for open market operations could produce substantial swings in both the federal funds rate and the money stock.

Under LRR, when the Fed must decide on how many reserves to buy or sell in the open market, banks' reserve requirements for the week have already been determined by the level of transactions deposits two weeks previous. No matter how much deposits expand or contract in the current week, they cannot affect banks' current reserve requirements. To the fixed amount of required reserves, the Fed can add its estimate of the amount of excess reserves banks will want to hold and the amount of reserves they will need to meet the public's currency demand in the current week. This will give the Fed an estimate of the financial system's total demand for reserves in the current week. Then the question is, how much of this relatively fixed demand for reserves the Fed should meet through open market operations. One thing to avoid is supplying too many nonborrowed reserves. Suppose the amount of reserves supplied through the open market were to exceed the demand for reserves initially. Some banks with extra reserves to lend in the federal funds market would find few, if any, banks willing to borrow, even at low interest rates. So the federal funds rate would begin to fall. Individual banks could rid themselves of their unwanted excess reserves by writing more loans. Customers spending the proceeds of the loans would move the reserves to other banks. But the extra reserves would still be available to the banking system as a whole. And even though the loans create more transactions deposits, the additional deposits do not raise the current week's reserve requirements. So the funds rate would keep falling and the money stock would keep growing until, ultimately, banks elected to hold enough excess reserves or the public elected to hold enough of the additional money as currency to use up the extra reserves.

To avoid the potential difficulties associated with supplying more reserves than banks demand, the Fed usually attempts to supply fewer reserves through open market operations than banks demand, thereby forcing banks to borrow the rest at the discount window. But the Fed cannot use this strategy and sustain a penalty discount rate. As long as the amount of reserves the Fed supplies

supply of reserves and the quantity of money. Even after CRR is implemented, the amount by which money expands when the Fed increases reserves will still depend on the reaction of depository institutions and the public to the added reserves. And the success of shifting to CRR also will depend on the extent to which, and the conditions under which, depository institutions supplement their nonborrowed reserve holdings by borrowing reserves at the Fed's discount window.

THE WAY THE DISCOUNT WINDOW WORKS NOW

The Fed decides on the size of its open market operations unilaterally, but the volume of discount window borrowing represents the interaction of the Fed with the depository institutions eligible to borrow. The Fed establishes the rules and procedures under which depository institutions may borrow. The depository institutions seek to use the borrowing privilege to their best advantage without violating the rules.

The Fed usually sets the basic discount rate, the rate at which banks can borrow short-term funds at the discount window, below prevailing short-term market interest rates, such as the federal funds rate. But the Fed does not intend for banks to use the discount window simply as an inexpensive source of funds. Rather the Fed wants banks to view the discount window as a "last resort"—a source of funds when they face unexpected needs for funds and have already exhausted all other reasonable sources. This intention is stated both in the Fed's Regulation A, which sets out the guidelines for discount window borrowing, and in an explanatory pamphlet on the discount window

in the open market is less than the amount banks need to meet reserve requirements, competition among banks for those reserves will keep the federal funds rate at least as high as the discount rate. Even if the Fed were to start out with a relatively high discount rate, so that it initially imposed an interest penalty on borrowing, the relative shortage of nonborrowed reserves would force the funds rate higher and higher until it finally broke through the "penalty" rate, and borrowing filled the gap between the demand for reserves and supply of nonborrowed reserves.

So with LRR still in place the Fed generally maintains a discount rate below the federal funds rate. In fact, the Fed uses the sensitivity of borrowing to the federal funds rate, which a relatively low discount rate provides, to help control the money stock in the short run. The fewer reserves the Fed supplies in the open market, the more banks are forced to borrow at the window. Based on previous experience, the Fed can estimate how high the funds rate will have to go to generate the expected or desired level of borrowing. It can then estimate how much money the financial system will be willing to create, and the public will be willing to hold, at that funds rate. So the link between banks' discount window borrowing and the spread of the funds rate over the discount rate allows the Fed to use its reserve operating procedure to influence the money supply in the short run, even with LRR.

Keeping a relatively low discount rate has an advantage for short-run money control when the unexpected happens as well under LRR. If banks unexpectedly change their willingness to borrow at the window or their desire to hold excess reserves, or if the pubic decides on an unexpectedly large proportion of currency in its money holdings, the interest-sensitive discount window helps minimize the impact of these changes on the prevailing funds rate and hence, as under CRR, helps minimize their impact on the outstanding money stock. And if the public's demand for money unexpectedly shifts under LRR, banks' decisions to accommodate the shifts will not affect their current demand for reserves, as it does under CRR.[a]

[a]A recent study of discount rate policy under reserve targeting is "The Impact of Discount Policy Procedures on the Effectiveness of Reserve Targeting" by Peter Keir in *New Monetary Control Procedures*, Federal Reserve Board Staff Study, Volume I, (February 1981).

that the Fed provides to eligible depository institutions.[6]

While the Fed frowns on the notion of borrowing for profit, the guidelines themselves are extremely broad, and the discount officer at each Federal Reserve Bank has the discretionary authority to decide on the appropriateness of each borrowing request. This discretionary procedure imposes costs on banks that borrow—the costs of providing information to, and negotiating with, the Federal Reserve Bank. These costs have proven sufficient to keep most banks away from the window, even when market rates are substantially higher than the discount rate.

When banks do decide to come to the discount window, the Fed's administrative procedures typically serve to limit their borrowing. If a particular institution exhibits a well-defined pattern of borrowing, borrows frequently, or borrows in relatively large amounts, the Fed becomes concerned that some of the institution's borrowing may be inappropriate, and subjects each additional request for borrowing to closer scrutiny. Ultimately, such a

[6]"The Federal Reserve Discount Window", Federal Reserve Publication, (October 1980).

The Fed lends reserves to banks primarily through its adjustment credit program, and it is with adjustment borrowing that the present discussion is concerned. In September 1980, the Fed amended Regulation A to establish an extended credit program under which depository institutions could borrow for longer periods than under the adjustment credit program. The amounts borrowed and numbers of institutions involved thus far have been relatively small. For a discussion of the extended credit program, see Janice M. Moulton, "Implementing the Monetary Control Act in a Troubled Environment For Thrifts," this *Business Review*, (July/August 1982) pp. 13-21.

borrower may be turned down and told to avoid the window for "an extended period." In short, the more a bank borrows at the discount window, the more costly each additional dollar of borrowing becomes. The explicit interest rate the bank pays on each dollar—the discount rate—stays the same, but the implicit costs it must bear—including the potential costs of impaired future borrowing privileges—rise with each additional dollar borrowed. These rising costs of borrowing limit the amount that banks choose to borrow at the discount window. The profit-seeking bank will borrow only up to the point where the costs of borrowing another dollar would more than offset the gain, as measured by the spread between market interest rates and the discount rate.

Of course, the wider the spread between market rates and the discount rate the greater the benefit from each dollar borrowed, and the more worthwhile borrowing at the discount window becomes. Economists find that borrowings rise significantly as the federal funds rate rises above the basic discount rate. When the federal funds rate falls below the discount rate, adjustment borrowing typically drops to minimal levels (see Figure 1).[7] Thus, as long as the discount rate is below the federal funds rate, borrowing is "interest-sensitive." But, when the discount rate is above the federal funds rate, as would be the case under a penalty discount rate, borrowing is not "interest-sensitive."

It might be argued that the Fed's current administrative procedures are not particularly efficient for achieving the stated purpose of the window. If the Fed were simply to keep the discount rate above the prevailing funds rate, the incentive for inappropriate borrowing would be eliminated and the Fed could dispense with its complicated administration of the discount window. With the discount rate set at a penalty level, a bank naturally would seek adjustment credit only when it unexpectedly needed funds and could not raise them from its usual market sources, just as the Fed intends.

The important question is whether the sensitivity of borrowing to movements in the federal funds rate, produced by setting a relatively low discount rate, improves or weakens the Fed's control over the money stock. Under the reserve operating procedure, once the FOMC has decided on a money growth target, the Fed staff must estimate how many nonborrowed reserves must be supplied in order to achieve that target. First, the Fed staff must estimate how much of the targeted money stock the public will choose to hold as currency and how much as transactions balances at depository institutions. They can then determine how many reserves banks will need in order to provide the currency demanded and to meet the reserve requirements against the transactions balances. (Under CRR, required reserves will change as soon as transactions balances change.) To that amount the staff must then add its estimate of the amount of reserves banks will need to meet reserve requirements on certain nontransactions balances and its estimate of the amount of excess reserves banks will want to hold. This gives an estimate of the *total* amount of reserves the Fed must supply to meet its money stock goal. The staff then subtracts the amount of reserves that the FOMC judges banks will borrow at the discount window, yielding a target for the nonborrowed reserves to be supplied through open market operations.

As long as all of the Fed's estimates are accurate, the reserves it supplies through the open market will keep the money stock on target, regardless of the particular discount window policy in effect. It is when the Fed's estimates are off that discount window administration matters. Would a discount rate below the federal funds rate, which keeps borrowings sensitive to federal funds rate changes, help minimize the impact of such errors on the money stock, or would a penalty discount rate do a better job? That is not an easy question to answer; it depends on the source of the error. The amount of money in the hands of the public is, as economists are fond of saying, a matter of supply and demand. The argument for going to a penalty

[7] A study by Stephen M. Goldfeld and Edward J. Kane, "The Determinants of Member Bank Borrowing: An Econometric Study," *Journal of Finance* vol. 21 (1966), pp. 499-514, is often cited as the classic analysis of banks' discount window behavior. For empirical estimates of the borrowing relationship based on more recent data see, for example, the equations estimated in "Policy Robustness: Specification and Simulation of a Monthly Money Market Model," by Peter A. Tinsley, and others, in the *Journal of Money, Credit and Banking*, vol. 14 part 2, (November 1982) pp. 830-856, and in "Detecting and Estimating Changing Economic Relationships: The Case of Discount Window Borrowings," by D.H. Resler, J.R. Barth and P.A.V.B. Swamy, Federal Reserve Board Special Studies Paper No. 165 (August 1982).

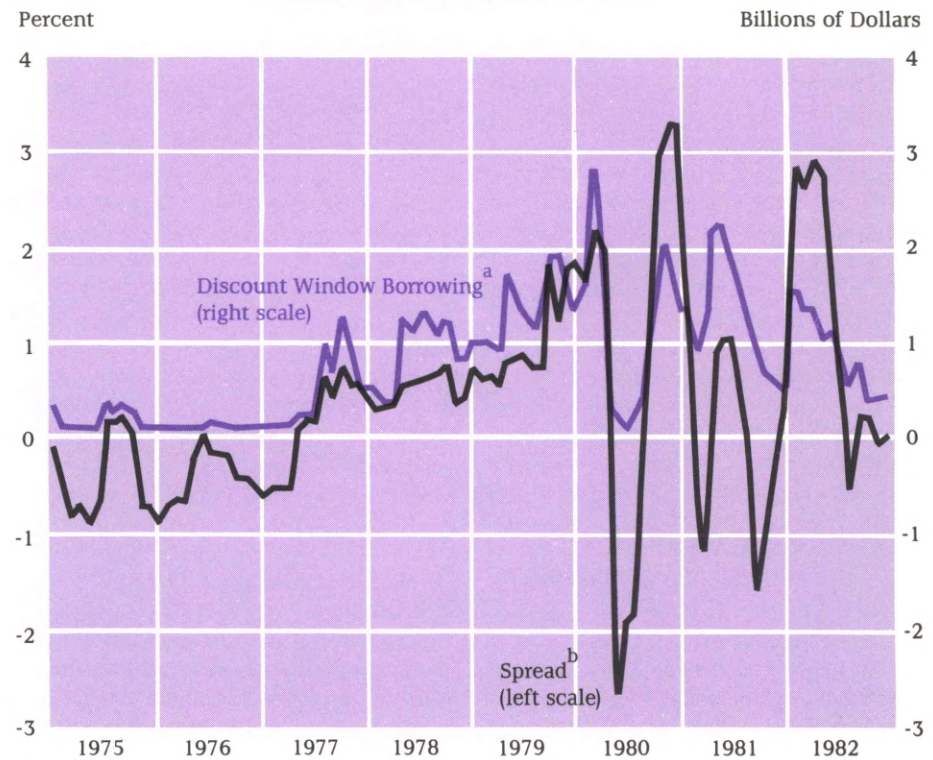
discount rate hinges on the Fed's finding it easier to predict how much money the financial system will be willing and able to *supply* than it is to predict how much money the public will *demand*.

SOMETIMES THE CURRENT DISCOUNT WINDOW POLICY WOULD IMPROVE MONEY CONTROL

If the Fed makes an error in assessing the willingness or ability of the financial system to supply money, then an interest-sensitive discount window would help minimize the impact of the error on the actual money stock. Such an error could occur for several reasons. The public may choose to hold an unexpectedly large ratio of currency relative to transactions accounts, or choose to hold more in reservable nontransactions accounts than the Fed had expected. Banks may

FIGURE 1

DISCOUNT WINDOW BORROWING FLUCTUATES WITH THE SPREAD BETWEEN THE FEDERAL FUNDS RATE AND THE DISCOUNT RATE



[a]The monthly average of total discount window borrowing less borrowing under the extended credit program.

[b]The monthly average of the federal funds rate less the sum of the basic discount rate plus the surcharge. During two separate periods in 1980 and 1981, the Fed imposed a surcharge on adjustment borrowing by institutions with $500 million or more in deposits that borrowed in successive weeks or more than four weeks in a calendar quarter. For a good discussion of the surcharge's impact, see "The Discount Rate: Experience Under Reserve Targeting," by Gordon H. Sellon, Jr. and Diane Seibert in the Federal Reserve Bank of Kansas City *Economic Review* (September-October 1982), pp. 3-18.

want to hold more excess reserves than the Fed had anticipated, or they may start out less willing to borrow reserves at the discount window than the Fed thought they would be. Any of these circumstances would leave the financial system with fewer reserves available to meet reserve requirements on transactions balances than the Fed had expected. With CRR, that means more reserves would have to be added in the current settlement period in order to keep transactions accounts, and hence the quantity of money, from falling below target. An interest-sensitive discount window would keep money closer to target by inducing banks to borrow more reserves to make up the shortfall.

Suppose, for example, individual banks unexpectedly decide to hold more excess reserves. As a result, the demand for reserves is greater than the Fed expected, and competition for the available reserves puts unexpected upward pressure on the federal funds rate. The higher funds rate widens the positive spread on discount window borrowing when the discount rate is below the federal funds rate. This, in turn, induces banks to step up their borrowing from the Fed, thereby increasing the quantity of reserves supplied and bringing the money supply back up towards target.

Similarly, the impact of any unexpected increase in the ability of the financial system to supply money—such as a smaller than expected ratio of currency to transactions accounts ratio, or a sudden decrease in excess reserve holdings—would be at least partly offset if the Fed were to maintain a discount rate below the federal funds rate. The interest-sensitive discount window that this policy produces would tend to reduce the quantity of reserves supplied and help keep the money stock from overshooting its target.

Under a penalty discount rate, any errors the Fed makes in estimating the strength of the financial system's willingness and ability to supply money also would produce unexpected movements in the federal funds rate. But as long as the discount rate is kept above the funds rate as it changes, these funds rate movements would not generate a positive spread on discount window borrowing, and would not affect the level of borrowing and the total supply of reserves. The money stock would proceed unexpectedly off course. Thus, the more uncertain the Fed is concerning the behavior of the financial system in supplying money, the less desirable a penalty discount rate is. However, if the Fed's uncertainty is instead about the public's demand to hold money balances, then a penalty rate may be advantageous.

BUT SOMETIMES A PENALTY DISCOUNT RATE WOULD PROVIDE BETTER MONEY CONTROL

When choosing the appropriate level of open market operations, the Fed must consider the public's demand for money as well as the factors affecting the financial system's ability to supply money. In estimating the demand for money, the Fed can take advantage of certain stable economic relationships: the public's demand for money depends fundamentally on the level of economic activity and the level of interest rates. But the Fed's estimates of money demand are still subject to error.

In our economy, few transactions involve the direct exchange of goods and services; almost all involve the exchange of goods or services for money. So the greater the volume of transactions households and businesses intend to carry out, the more money they will want to have on hand. Since the overall volume of transactions rises and falls with the volume of goods and services bought and sold, economists find a strong direct relationship between the quantity of money the public demands and measures of economic activity such as gross national product: as GNP rises, so does the quantity of money demanded.

On the other hand, economists find an inverse relationship between interest rates and the quantity of money people want to hold: as interest rates rise, the quantity of money demanded declines. Money offers its holder the convenience of making market transactions right away, but it pays either no interest or low interest compared to the rates being paid on alternative short-term financial instruments. So as the rates on short-term instruments rise, people have an incentive to economize on their money holdings and buy more of these instruments. Consequently economists find that the quantity of money the public demands moves inversely with the general level of interest rates.

The relationship of money demand to levels of economic activity and interest rates helps the Fed assess the likely strength of that money demand.

But the relationships are not known with precision. Even if they were, the Fed's assessments still would be subject to error simply because data on the economy's performance are not immediately available. Futhermore, other factors affect the public's demand for money. Some factors, such as seasonal influences, the Fed finds relatively easy to predict. But other factors, such as the impact of technological or financial innovations, are more difficult to predict. So for a variety of reasons, the Fed's money demand forecasts are far from precisely correct.

When the Fed errs in assessing the strength of the public's demand for money, a relatively low discount rate, which keeps borrowing sensitive to funds rate changes, magnifies its impact on the quantity of money. On the other hand, a penalty discount rate, which keeps bank borrowing from responding to funds rate changes, virtually eliminates the impact of such a forecasting error on the stock of money.

Suppose, for example, that a sudden increase in the level of economic activity causes an increase in the public's demand for money which the Fed did not expect when it decided how many nonborrowed reserves to supply. As banks accommodate their customers' demands, outstanding transactions balances at the banks grow. Under CRR, the banks must now hold additional reserves. They go to the federal funds market to procure the reserves and the increased demand for reserves begins to bid up the federal funds rate. What happens next depends on the Fed's discount rate policy.

If the Fed has set the discount rate below the funds rate, the rising funds rate opens up a larger spread and automatically induces some banks to borrow more at the window. If borrowing is extremely sensitive to the spread, then, with just a very small increase in the federal funds rate, the discount window will provide nearly all the reserves needed to meet the reserve requirements on the additional transactions balances the public demands. In that case the Fed would overshoot its targeted money supply by an amount almost equal to the unexpected increase in money demand. If borrowing is less sensitive to the spread (but the discount rate is still not a penalty rate), then the unexpected increase in the funds rate will be larger, and the unexpected increase in total reserves will be smaller, but the surge in money demand still will cause some overshooting of the FOMC's money target.

Suppose, on the other hand, that the Fed had set the discount rate at a level well above the federal funds rate. As before, in response to the surge in money demand, banks come to the funds market to obtain more reserves and the funds rate begins to rise. But as long as the discount rate is kept above the funds rate, the spread remains negative and banks have little incentive to increase their borrowing from the Fed, so total reserves do not grow. Meanwhile, the rising funds rate is making it more expensive for banks to meet reserve requirements on transactions balances. Consequently, banks begin to raise the rates they charge on loans. In addition, they try to induce the public to hold more of the instruments on which there are no reserve requirements by offering higher interest rates on those instruments. Thus, higher market interest rates work to reduce the amount of money that the public wants to hold, restoring it to the amount that the Fed had initially expected. By setting a penalty discount rate then, the Fed allows rising interest rates—a rising funds rate, rising loan rates, rising rates on other instruments—to choke off the impact of an unexpected increase in the public's demand for money and thereby keeps the money supply on target.

In the face of an unexpected decline in the public's demand for money, setting a penalty discount rate enjoys a similar advantage over a discount policy that keeps the discount rate relatively low. With CRR, the initial decline in money demand immediately reduces the demand for reserves and hence, the funds rate. If the discount rate is kept below the funds rate, discount window borrowings fall, total reserves fall and the actual money stock falls below target. But if the discount rate had been set at a penalty level, the declining funds rate would not reduce borrowing any further, so the supply of reserves would remain unchanged, and generally falling interest rates would work to maintain the amount of money the public is willing to hold at the targeted level.

In short, when the Fed makes errors in forecasting the public's demand for money, maintaining a penalty discount rate forces market interest rates, rather than the money stock, to make the adjustment. So when these errors occur, interest

rates will rise or fall by more than the Fed had expected, but the money stock will remain closer to the target the Fed had set.[8]

CONCLUSION

Over the past several years, the Fed has been in the process of reworking its major policy tools so that its control over the supply of reserves will produce better control over the nation's stock of money. First, the FOMC restructured its procedures for controlling money growth by focusing the conduct of open market operations on the supply of nonborrowed reserves rather than on the level of the federal funds rate. More recently, the Board of Governors adopted a system of contemporaneous reserve requirements that will tighten the short-run relationship between reserves and the amount of money the financial system creates. Nonetheless, elements of unpredictability will remain in the monetary control process.

Would maintaining a penalty discount rate eliminate these elements of unpredictability? Unhappily, it would not eliminate them entirely. In the face of unexpected shifts in the public's demand for money, keeping a penalty discount rate would reduce the magnitude of unexpected movements in the actual money stock. But when unexpected shifts occur in the willingness and ability of the financial system to supply money, a penalty discount rate would amplify their impact on the money stock. So a penalty rate would provide better money control only to the extent that the Fed finds it more difficult to predict the public's demand for money than to predict the financial system's willingness and ability to supply money.

Other proposals for discount window reform have been made with the aim of achieving a balance between the current administrative procedures and setting a penalty discount rate. Their aim is to reduce, rather than virtually eliminate, the interest-sensitivity of discount window borrowing.[9] One suggestion is to maintain a relatively low discount rate, but to increase the additional costs imposed on large or frequent borrowers, either by tightening District Banks' administrative procedures for handling banks' borrowing requests or by imposing a system of graduated surcharges on heavy borrowers. Another approach is to prevent federal funds rate movements from creating too big a spread between the funds rate and the discount rate by adopting a formula for adjusting the discount rate automatically as market rates fluctuate.

In short, once CRR is in place, reworking discount window procedures might very well improve the Fed's short-run control over the money stock. But determining whether a penalty rate would improve money control, or how much of an improvement the various compromise alternatives would make, must await an assessment of the predictability of the public's demand for money and the predictability of the financial system's willingness and ability to supply it.

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[8]The problem of how the discount window fits into the money control process is given a graphical treatment in, "The Role of the Discount Rate in Monetary Policy: A Theoretical Analysis," by Gordon H. Sellon in the Federal Reserve Bank of Kansas City *Economic Review* (June 1980) pp. 3-15 and "Should the Discount Rate Be A Penalty Rate?" by J.A. Cacy, Bryon Higgins and Gordon H. Sellon, Jr. in the Federal Reserve Bank of Kansas City *Economic Review* (January 1981) pp. 3-10. For a mathematical approach, see "Simple Analytics of the Money Supply Process and Monetary Control," by Daniel Thornton in the Federal Reserve Bank of St. Louis *Review* (October 1982) pp. 22-39.

[9]Some of these proposals also are intended to make the degree of interest-sensitivity to borrowing more certain. It is important to note that in choosing among alternative proposals for discount window reform, improved money control may not be policymakers' only criterion. A penalty discount rate, for example, may make short-run money growth more predictable while making short-term interest rate movements larger or more volatile. So if policymakers are concerned about the magnitude or variability of interest rate movements, then this complicates the choice of discount window policy. On the other hand, by maintaining a discount rate below short-term market interest rates, the Fed subsidizes the banks that do borrow at the window. So if policymakers are concerned about the extent to which borrowing banks are receiving a subsidy, then this also may influence their choice among discount window policies.

When Is the Prime Rate Second Choice?

*by Brian C. Gendreau**

Not long ago, little controversy surrounded the prime rate convention. The prime rate was understood to be the rate banks charged on loans to their most creditworthy corporate customers. Other corporate borrowers paid a rate marked up over the prime. Though prime-related loans were generally floating-rate loans—such that borrowers' loan rates changed with the prime—the prime rate usually rose and fell gradually, giving customers a measure of stability in their borrowing costs.

Banks still post prime rates, and changes in the prime continue to be reported on national newscasts and greeted by bursts of trading activity in securities markets. But now the prime seems to change faster in response to market interest rate movements. Moreover, many loans are being made at rates below the prime. According to a Federal Reserve Board survey of the terms of all short-term business loans granted by 48 of the nation's largest banks, in the first week of November, 1982, over 92 percent were at rates below the prime.

Consequently, many commentators now doubt that the prime is a useful benchmark loan rate. After the staff of the House Banking Committee studied lending practices at ten large banks in early 1981, Chairman Ferdinand St. Germain concluded that "the prime rate has been so often misused, abused, and tortured in recent years that the phrase now seems beyond repair." Secretary of the Treasury Donald Regan concurs that the prime rate no longer reflects loan costs accurately, and recently proposed creating in its stead a "watch rate" set at half a percentage point above the commercial paper rate—the interest rate firms pay on short-term notes sold in money markets. Why have bank lending practices changed? What kinds of loans are being made below prime? What does the prime rate mean today? The answers depend in part on the characteristics of the prime, and especially on the manner in which prime rate changes are determined.

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THE PRIME: A CURIOUSLY STICKY RATE

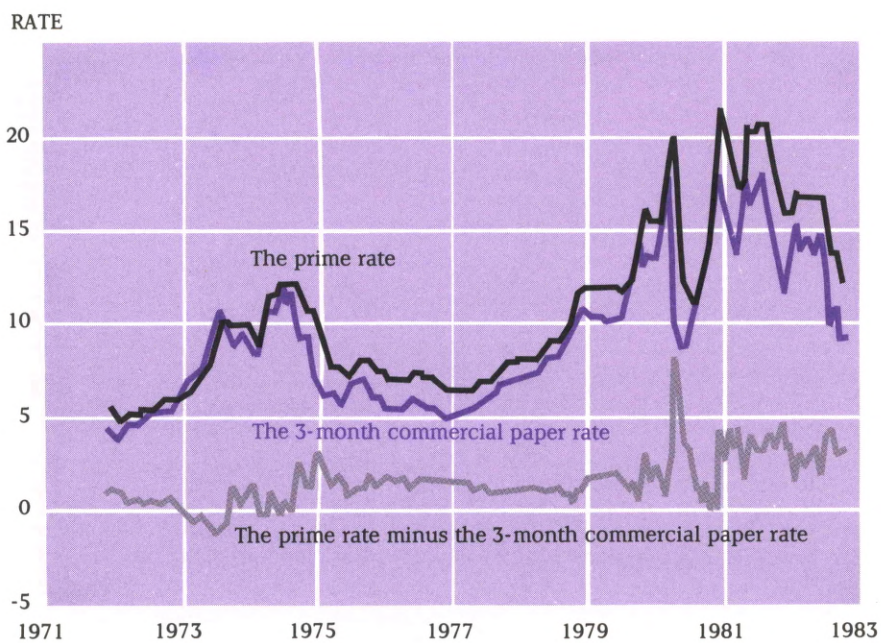
Popular definitions of the prime rate usually distinguish it from other rates by the credit quality of the underlying loan. The prime rate also differs importantly from other interest rates, however, in the way it reacts to changes in credit market conditions. While rates on money market instruments such as Treasury bills and commercial paper change with trading throughout each day, the prime rate changes less frequently. In past years, when interest rates were more stable, the prime rate did not change for months or even years on end. Now the prime rate changes more often, but it still lags changes in market rates.

The stickiness in the prime rate is easily seen in Figure 1, which compares the movements of the prime rate, the 3-month commercial paper rate, and their difference from 1972 through 1982. The prime rate adjusts fully to short-term interest rate movements, but only after a substantial lag. When short-term rates rise, the prime rate initially does not keep pace, and the spread between the prime and short-term rates narrows and occasionally becomes negative. Conversely, when interest rates fall, the prime rate lags behind, and the spread between the prime and market rates widens appreciably.

The stickiness in the prime rate can be traced to a corresponding stickiness in banks' cost of attracting new funds from so-called *core deposits*—demand deposits and those time deposits subject to binding interest rate ceilings. Since Congress prohibited the payment of interest on demand deposits and authorized the Federal Reserve to limit the rates paid on time deposits in the Banking Act of 1933, banks have competed for core deposits by paying implicit interest in the form of services provided

FIGURE 1

THE PRIME RATE RESPONDS SLOWLY TO CHANGES IN MARKET INTEREST RATES



below cost. These services, which are provided on core deposits to this day, include check clearing, gifts, the convenience of a multitude of bank branches, extended hours, credit lines, and, for firms, payroll and cash management systems (see NONRATE COMPETITION AND THE PRIME).

Banks Adjust Implicit Deposit Rates Slowly. . . When interest rates are low and stable, banks have little difficulty in attracting core deposits by paying implicit interest. But when interest rates move higher and become more variable, bank deposit and loan pricing becomes more complicated. The problem is that implicit interest payments cannot be changed quickly in response to interest rate movements. It takes time to build new branches, to run or pull advertising campaigns, to mail out notices of changes in service charges (and to decide to do these things). Banks cannot hope to match frequent fluctuations in short-term interest rates with costly, cumbersome changes in services. Nonetheless, banks that fail to adjust their implicit interest payments to meet a permanent change in market rates risk losing customers.

Unable to change services quickly, yet compelled by competition to match eventually a sustained change in market rates, banks have little choice but to adjust implicit interest payments gradually to changes in market interest rates. Economists' estimates of the implicit interest rates paid by banks are consistent with this kind of rate setting behavior. Two estimated implicit interest rate series are presented in Figure 2 (p. 16). These estimates show that implicit rates respond to changes in market rates, but do not adjust on a one-to-one basis with changes in current period, short-term interest rates.[1]

. . .Making the Prime Rate Sticky. In seeking to maximize profits, banks adjust their loan rates to reflect changes in their costs in raising new funds. As long as some of these funds are obtained by paying implicit interest on core deposits, banks' costs in attracting additional funds will change only gradually in response to market rate movements. Since loans are priced as a markup over

[1] See Richard Startz, "Implicit Interest on Demand Deposits," *Journal of Monetary Economics*, 5 (1979), pp. 515-534, and Edward J. Stevens, "Measuring the Service Return on Demand Deposits," Federal Reserve Bank of Cleveland Working Paper No. 7601 (December, 1976). Startz's series is an estimate of the average implicit interest rate paid on all demand deposits, and is available through 1976. Stevens' series is an estimate of the implicit rates paid to attract extra (marginal) demand deposits, calculated under the assumption of perfect competition, and is available through 1974.

NONRATE COMPETITION AND THE PRIME

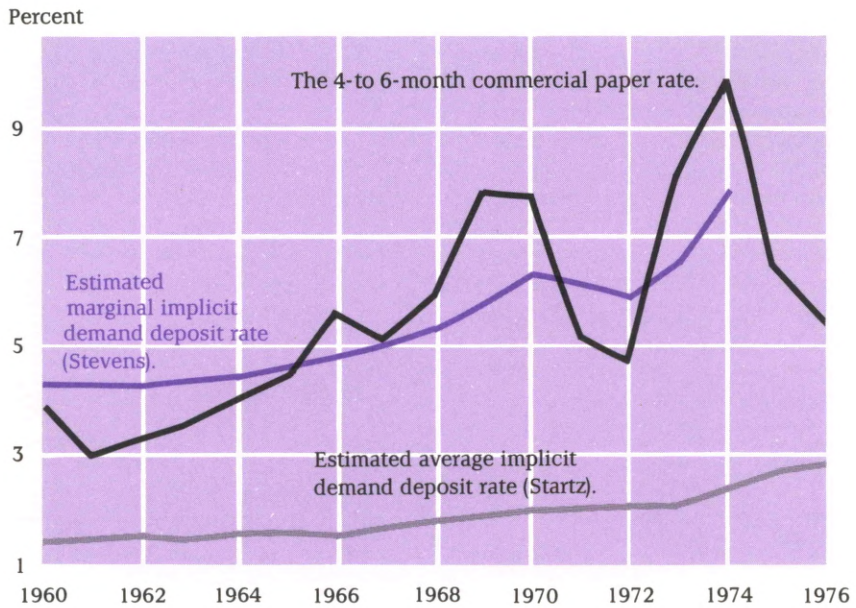
An industry-wide prime rate first emerged in 1934, shortly after Congress prohibited the payment of interest on demand deposits. Banks, having suffered three consecutive years of losses (in the aggregate) by 1934, welcomed the legal restrictions against deposit rate competition and began to compete for deposits by paying implicit interest in services, as they do to this day. The timing of the inception of the prime rate suggests that the prime is closely connected to nonrate deposit competition. Buy why would banks prefer nonrate to rate competition? And how is the prime linked to nonrate competition?

When banks engage in interest rate competition for deposits, they must pay the competitive rate on all deposits. This rate is highly visible, and can be compared with other banks' rates with ease. In contrast, with nonrate competition customers must undertake a costly search among banks to find the best loan and deposit service bundles. Once interest rate competition is prohibited, banks can take advantage of the imperfect information customers have about each other's services to reduce services below the competitive level. Moreover, by competing for deposits with services banks are able to reduce their costs by offering less in services to customers who are relatively insensitive to the return on their deposits than to more return-sensitive customers.

The prime rate is connected with nonrate deposit competition because many bank depositors are also borrowers. The most effective way to pay implicit interest to depositor-borrower customers is through loan rate concessions. Widespread loan rate concessions, however, would have wiped out the benefits of nonrate competition provided by deposit rate ceilings. Hence banks attempted to preserve nonrate competition by adopting a uniform rate for loans to their best customers—the prime rate—that served as a floor rate for industry-wide loan pricing.

FIGURE 2

ESTIMATES OF THE IMPLICIT INTEREST ON DEMAND DEPOSITS



SOURCE: See footnote 1 in the text.

these costs, loan rates will also change gradually.[2]

In the process of adjusting their loan rates, banks use the prime rate as an industry-wide pricing guide. Because there is no objective indicator of when bank costs have changed permanently, banks are likely to disagree over when the prime rate should change. But once a large money center bank has signaled its judgment that a given level of interest rates will be sustained by changing its prime rate, and other banks have ratified that change, a new guideline exists for loan pricing.

WHY IS THE PRIME RATE CONVENTION CHANGING?

Throughout the post-war period, the critical ingredient in banks' slow deposit and loan rate adjustment was their ability to attract core deposits when market rates were rising relative to implicit interest rates, and to retain loan customers when money market rates were falling relative to the prime rate. Though banks could not adjust services quickly to short-term interest rate fluctuations, they did attempt to attract deposits by offering a stable level of services that was attractive, on average, over the interest rate cycle. In some

[2]An added benefit to banks in making loan rates more in tandem with their costs of raising new funds from all sources is that by following such a strategy bank earnings will be unaffected by interest rate movements. Slow loan and deposit rate adjustment, moreover, is consistent with empirical evidence that, on the whole, bank profits are not very responsive to changes in market interest rates. See Mark J. Flannery, "How Do Changes in Market Interest Rates Affect Bank Profits?" this *Business Review* (September-October, 1980) pp. 13-22.

periods—particularly when interest rates were rising—implicit interest rates on core deposits fell below short-term market rates. But in periods of falling interest rates, implicit interest payments remained high relative to short-term money market returns.[3] Similarly, because the stickiness in implicit deposit rates was reflected in the prime, banks gave prime borrowers rates that were competitive with market rates, on average, over the interest rate cycle: borrowers' relatively high bank loan rates in periods of falling market rates were followed by comparatively low loan rates in periods of rising market rates.

When interest rates were low and stable, banks' strategy of competing for customers by offering deposit and loan products that were attractive on average relative to market rates was successful. Temporarily uncompetitive rates relative to market rates on bank deposits or loans were likely to be offset by more than competitive rates in the future, and the differences were not large enough to induce customers to search for more attractive rates in money markets.

Volatile Interest Rates Brought Competition From Money Markets. As interest rate swings became sharper and wider in the 1970s, however, more and more customers became dissatisfied with the slow rate adjustment on core deposits and on prime-related loans. Increasingly, customers bypassed banks to borrow and lend directly in money markets.

On the deposit side, customers shifted out of core deposits into money market instruments, such as commercial paper, with each big swing in short-term market rates above the implicit deposit rate. These shifts can be seen in Figure 3 (p. 18), where the ratio of commercial paper to demand deposits outstanding together with the spread between the 4-to-6 month commercial paper rate and estimates of the implicit rate paid on demand deposits have been graphed from 1960 to 1976. Initially, most of these shifts were by corporations. The rapid growth of money market mutual funds after the mid-1970s, however, facilitated households' shifts out of core deposits by opening the money markets to small investors previously unable to buy large denomination financial instruments. Once investors overcame costs involved in placing their funds in money markets, they never went back to holding as much of their assets in the form of core deposits, as reflected in the steady decline in the share of core deposits among large bank liabilities visible in Figure 4 (p. 19).

On the loan side, the spreads between the sluggish prime and the commercial paper rate widened to several hundred basis points during declines in market rates in the 1970s and 1980s, motivating large firms to incur the startup costs necessary to tap the money markets. About 500 new companies began to issue commercial paper in the years after 1974, boosting the amount of paper outstanding in that market from $50 billion in 1974 to almost $180 billion by mid-year 1982.[4]

Banks Responded By Moving Towards Market Rate Pricing. To replace the core deposits that could no longer be relied upon as their principal source of loanable funds, banks issued liabilities carrying market rates of interest such as domestic and Eurodollar certificates of deposit (CD's), money market certificates, and federal funds. By 1981, large banks were raising more than half their funds from interest-sensitive liabilities. As banks attracted fewer funds from the core deposits that were responsible for the sluggishness in deposit costs, they changed their loan rates faster in response to fluctuations in market interest rates. The average lag in the response of the prime rate to money market rates fell markedly between 1970 and 1982, from over 8 weeks in the early 1970s to slightly over 4 weeks in the 1979-1982 period (see the TECHNICAL APPENDIX, p. 22).

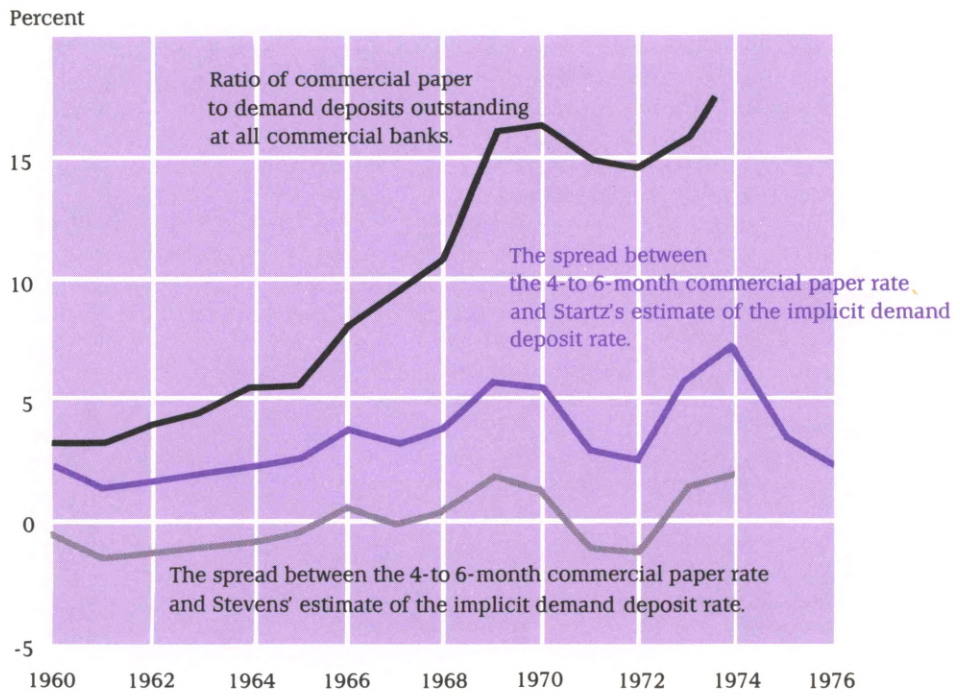
In addition to speeding up the pace of prime rate changes, banks hastened their move towards market rate loan pricing by offering loans tied to money market rates to customers with the ability to draw on the commercial paper market. These new loans—called money market loans—are

[3] Twice in the 1970s money market rates fell below passbook savings account rates. Because banks also paid implicit interest on savings deposits, these deposits must have been quite attractive to customers in these periods. For an analysis reconciling temporarily high core deposit costs with bank profit maximization, see Mark J. Flannery, "Retail Bank Deposits as Quasi-Fixed Factors of Production," *American Economic Review*, 72, (June 1982), pp. 527-536.

[4] See Evelyn M. Hurley, "The Commercial Paper Market Since the Mid-Seventies," *Federal Reserve Bulletin* (June 1982).

FIGURE 3

FAVORABLE RETURNS HAVE ENCOURAGED THE GROWTH OF COMMERCIAL PAPER RELATIVE TO DEMAND DEPOSITS



SOURCE: See footnote 1 in the text.

typically for short maturities (one month or less), and are matched by the bank to the size, rate, and maturity of a specific liability. A bank may, for example, issue a 30-day CD and use the funds to make a 30-day loan to a customer at a fixed rate over the CD rate. By matching the loan to a specific liability with the same maturity, bank earnings on the transaction are unaffected by interest rate fluctuations over the life of the loan. When the loan matures, the liability matures, too, and a new transaction can be made at the new market rates.[5] Money market lending is often carried out in close cooperation with the bank's financial instrument trading desk to ensure that the pricing and maturity matching on the transaction are precise. Because the rate on money market loans must be close to money market rates to be competitive, bank profit

[5]Not all money market loans are fixed-rate credits. Indeed, banks are now offering large customers an exotic variety of loans pegged to different short-term rates and adjustable (repriced) at different intervals. For example, some banks are making five-day loans with rates pegged to the daily federal funds rate. Others are making one-year loans priced as a markup over the 3-month Treasury bill rate, but repriced quarterly. These hybrid credits are likely close substitutes for and have rates highly correlated with those on the more numerous fixed-rate, short-term credits. No distinction is made in the text among the varieties of money market loans.

margins are small, and large transactions are necessary to cover the costs of arranging the loan.

WHAT ACCOUNTS FOR BELOW-PRIME LENDING?

In experimenting with money market lending in recent years, banks have offered corporate customers with good credit standing a choice between a variety of short-term credits tied to money market rates as well as prime-related loans with longer maturities. Given the stickiness in the prime rate, it was inevitable that rates on short-term loans tied to money market rates would fall below the prime when interest rates declined. In those periods, firms tried to reduce their borrowing costs by taking fixed-rate, short-term credits instead of prime-related loans. The responsiveness of fixed-rate borrowing to the spread between the prime and the 30-day commercial paper rate can be seen in Figure 5 (p. 20). The peaks in the proportion of large loans made with fixed rates occurred when the commercial paper rate fell below the prime. The peaks in fixed-rate lending in Figure 5 also mark periods of widespread below-prime lending. In both the first weeks of May, 1980 and November, 1981, for example, the weighted average rate on all commercial loans at surveyed banks was below the ruling prime rate. In those weeks the prime rate was over 800 basis points and 330 basis points, respectively, above the 30-day commercial paper rate. Given these cost differences, it should not be surprising that customers with the ability to take out loans at money market rates did so.

The recent episodes of fixed-rate lending and below-prime lending cannot be dismissed as mere aberrations from normal prime-related lending patterns. Since late 1979, as Figure 5 shows, a trend towards more below-prime lending developed at large banks, reflecting the trend toward more fixed-rate lending in large credits. Yet it would be premature to conclude that the prime rate is no more than an artifact of past lending practices. Assuming that the majority of floating-rate loans are prime-related, and that most large fixed-rate loans represent money market credits, Figure 5 shows that in many periods large banks make more floating-rate loans (in dollars of credit extended) than money market loans, and that even in periods of massive fixed-rate lending large banks still

FIGURE 4

DEMAND AND SAVINGS DEPOSITS HAVE FALLEN RELATIVE TO INTEREST-SENSITIVE FUNDS IN LARGE BANKS' LIABILITIES

Percent of Total Liabilities

Date	Demand and Savings Deposits	Interest-Sensitive Funds[a]	Other Liabilities
1972	52.3	28.8	18.9
1973	45.9	38.3	15.8
1974	40.9	45.3	13.8
1975	41.7	44.1	14.2
1976	46.7	39.0	14.3
1977	45.4	40.0	14.6
1978	42.3	43.7	14.0
1979	39.1	47.2	13.7
1980	36.1	48.2	15.7
1981	33.1	50.9	16.0
1982	28.6	53.8	17.6

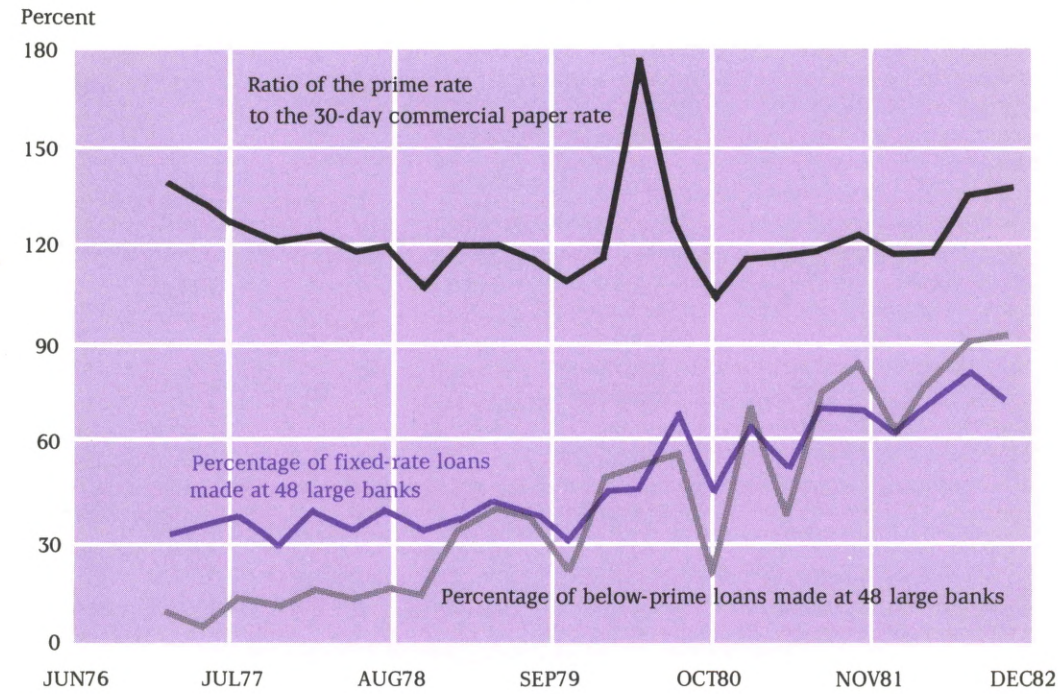
Data are for Large Weekly Reporting Banks with Assets of $2 billion or more in 1972 dollars as of June of each year.

[a]Interest-sensitive funds are defined as the sum of federal funds purchased, time deposits in accounts of $100,000 or more, and other borrowings (including liabilities to foreign branches as a proxy for Eurodollar borrowings).

SOURCE: Weekly Report of Assets and Liabilities for Large Banks, Board of Governors, Federal Reserve System.

FIGURE 5

BELOW-PRIME LENDING AND FIXED-RATE LENDING VARIES WITH THE RATIO OF THE PRIME TO MONEY MARKET RATES



SOURCE: *Federal Reserve Bulletin* and unpublished portions of the Survey of Terms of Bank Lending.

make some prime-related loans.[6] Data collected in the Federal Reserve's Survey of the Terms of Bank Lending indicate, moreover, that fixed-rate lending and below-prime lending are not as widespread at small and medium-sized banks as at large banks.

The reason prime-related loans coexist with money market loans is that not all loan customers can substitute money market loans for prime-related credits, and those who can do not find them to be perfect substitutes. Prime-related loans today, as in past years, are generally floating-rate loans, usually repaid in 60 to 90 days, that are used as working capital by businesses.[7] A firm will not substitute money market loans or commercial

[6] No data are available on the quantities of prime-related and money market loans. Conversations with bankers, however, indicate that most floating-rate loans are tied to the prime rate. Though not all fixed-rate credits are short-term money market loans, the fixed-rate credits of $1 million or more graphed in Figure 5 generally had average maturities of one month or less, and thus may be considered money market loans.

[7] Prime-related loans are commonly made with a variety of fixed maturities, as well as on demand. A precise average maturity for prime-related loans thus cannot be provided. Survey data and conversations with bankers, though, indicate that 60 to 90 days is a reasonable approximation of the normal effective maturity of prime-related loans.

paper for prime-related loans if its funding needs are small, because only large money market credits and commercial paper issues will overcome the fixed costs of going to the market. If a firm's credit is less than impeccable, it will not be able to sell its commercial paper, and will have little power in bargaining for a money market loan from its bank. Even firms with funding needs and a credit standing allowing them to obtain money market loans will not always do so, because it is not always clear that a string of short-term credits at market rates will be less expensive than a single prime-related loan. If interest rates were to take an unexpected upturn over the firm's borrowing horizon, for example, the rate increases on market-related credits could outstrip the more slowly changing costs of prime-related credit.

For these reasons, small firms without access to the commercial paper market and larger firms with less than flawless credit are likely to find prime-related loans attractive. Large, creditworthy firms, furthermore, can be expected to continue to bargain with banks for money market loans when interest rates are falling rapidly, and to try to switch back into prime-related loans when rates are rising or are expected to remain unchanged.

CONCLUSIONS

The distinguishing feature of the prime rate has always been its stickiness in comparision with money market interest rates. The prime has never been closely related to any specific current short-term rate, but instead has been priced as a markup over banks' cost of raising new funds from all sources. A substantial portion of these funds have been from deposits subject to interest rate ceilings, and have been paid for by banks with implicit interest in the form of services. Because these implicit interest payments were difficult and slow to adjust, banks' cost of funds, and hence their loan rates, were slow to adjust to fluctuations in market rates.

As interest rates became higher and more volatile in the past fifteen years, the incentive for customers to bypass banks and borrow and lend directly in money markets strengthened. Banks responded by issuing liabilities carrying market rates of interest to finance their loans, by speeding up changes in the prime rate, and by offering customers loans with rates tied to the rates on money market instruments. Much of the below-prime lending in recent years occurred when the rates on these money market loans fell below the more slowly moving prime during a decline in interest rates.

With the advent of a large quantity of below-prime lending, the prime no longer represents the lowest rate at which banks are extending credit. But prime-related lending is far from gone. Firms without the credit standing or funding needs to tap money markets are likely to receive prime-related loans for some time in the future. And even those firms with the ability to issue their own paper in the market are likely to find prime-related loans attractive when interest rates are unchanged or rising.

As deposit rate ceilings are phased out and demand and savings deposits are replaced by banks' new money market accounts, bank loan rates will move more closely with market rates. Banks and their customers are likely to find a reference rate for the cost of short-term credit like the prime useful in the future, but it will probably be a faster moving, more closely market-related rate than today's prime.

TECHNICAL APPENDIX

HAS THE WAY THE PRIME IS PRICED CHANGED?

Bankers' formulas for pricing loans and economists' models of setting loan rates are often based on regressions of the prime on current and past money market rates. These regressions contain estimates of the average lag of adjustment of the prime rate to market rates. By estimating these regressions over different periods and comparing the average lags, we can tell whether the speed of adjustment of the prime has changed over time.

Changes in the source of funds used to make loans in turn change the speed with which the prime adjusts to market rates. Consider, for example the simple case of banks that raise in any period t, a portion α of their loanable funds from liabilities by paying a market rate of interest RCD_t, and the rest $(1 - \alpha)$ from demand deposits by paying implicit interest in the form of services at the rate RDD_t. The banks will set their prime rate PR_t as a markup γ over the weighted cost of raising extra funds from both sources, as:

(1) $$PR_t = \gamma + \alpha RCD_t + (1 - \alpha)\, RDD_t$$

$$0 \leq \gamma\,,\ 0 < \alpha < 1$$

If banks paid a competitive, market rate of interest at all times on demand deposits, then $RDD_t = RCD_t$, and the prime would be set simply as a markup on current market rates:

(2) $$PR_t = \gamma + RCD_t$$

Banks, however, generally adjust the services they pay on demand deposits incompletely to changes in current market rates. The inability to adjust services quickly, uncertainty about whether market rate changes are permanent or transitory, and avoidance of interest rate risk will all contribute to a gradual adjustment of implicit interest rates to market rates. Assuming for expository purposes that all adjustment takes place within two periods, this process can be represented as:

(3) $$RDD_t = \beta_1\, RCD_t + \beta_2\, RCD_{t-1}$$

$$0 < \beta_1,\ \beta_2 < 1$$

Substituting equation (3) into equation (1) gives an expression for the prime as a function of current and past market rates:

(4) $$PR_t = \gamma + \theta_1\, RCD_t + \theta_2\, RCD_{t-1}$$

where: $$\theta_1 = (\alpha + \beta_1 - \alpha\beta_1)$$

and $$\theta_2 = (\beta_2 - \alpha\beta_2).$$

In equation (4) it is easy to see that as the proportion of funds from interest-sensitive liabilities α increases, current rates will get a larger weight in setting the prime. If all bank funds are interest sensitive ($\alpha = 1$), the prime rate will be a markup over current rates alone. If instead banks attract all their funds from demand deposits ($\alpha = 0$), the prime rate will be a markup of the relation of implicit interest rates to market rates as given in equation (3). Changes in the sources of bank funds should be reflected in different coefficient estimates over time in a regression of the prime against current and past market rates as specified in equation (4).

Adjustment Lag Estimates. To measure the changes in the adjustment lag of the prime to market rates, the prime was regressed against a distributed lag of current and past 3-month CD rates, using weekly data for each of the four three-year periods between November 4, 1970 and September 29, 1982. The 3-month CD rate was taken to be representative of rates on banks' interest-sensitive liabilities. A geometrically declining pattern of weights extending indefinitely into the past was specified for each regression, under the assumption that banks place progressively less weight on market rates further in the past in setting the

prime.[a] (Reasonable values of α and the β_1 coefficients in a regression of equation (4) with lags extending further into the past will produce a geometric lag distribution like the one used here in estimation.)

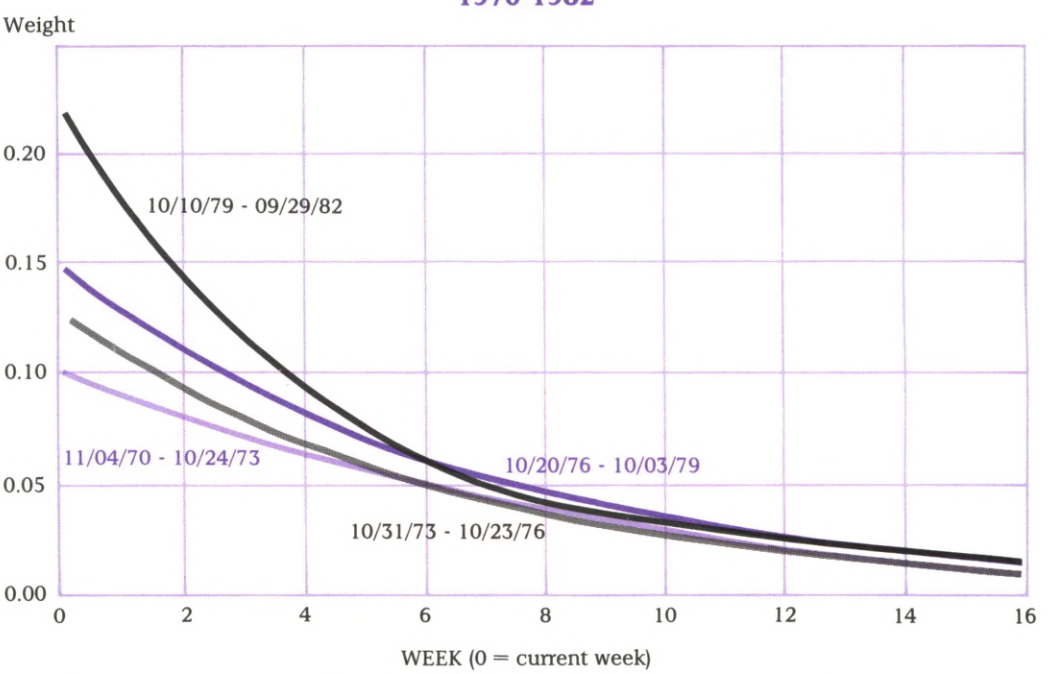
The estimated weights on the current and past CD rates from the regressions are shown in the figure below. The estimated average lag in adjustment of the prime rate to changes in CD rates has changed significantly over the four periods, and has generally been getting shorter over time, as can be seen in the table. By these estimates, the prime was adjusted twice as fast over the 10/10/79 to 9/29/82 period as it was between 11/4/70 and 10/24/73. This quicker adjustment speed is reflected in the visibly steeper pattern of estimated weights in the figure below, indicating that banks have placed heavier weights on current and recent weeks' CD rates in setting the prime in more recent years.[b]

Interval	Mean Lag in Adjustment of Prime To CD Rate Changes (in weeks)
11/04/70 - 10/24/73	8.26
10/31/73 - 10/23/76	5.85
10/20/76 - 10/03/79	6.35
10/10/79 - 09/29/82	4.15

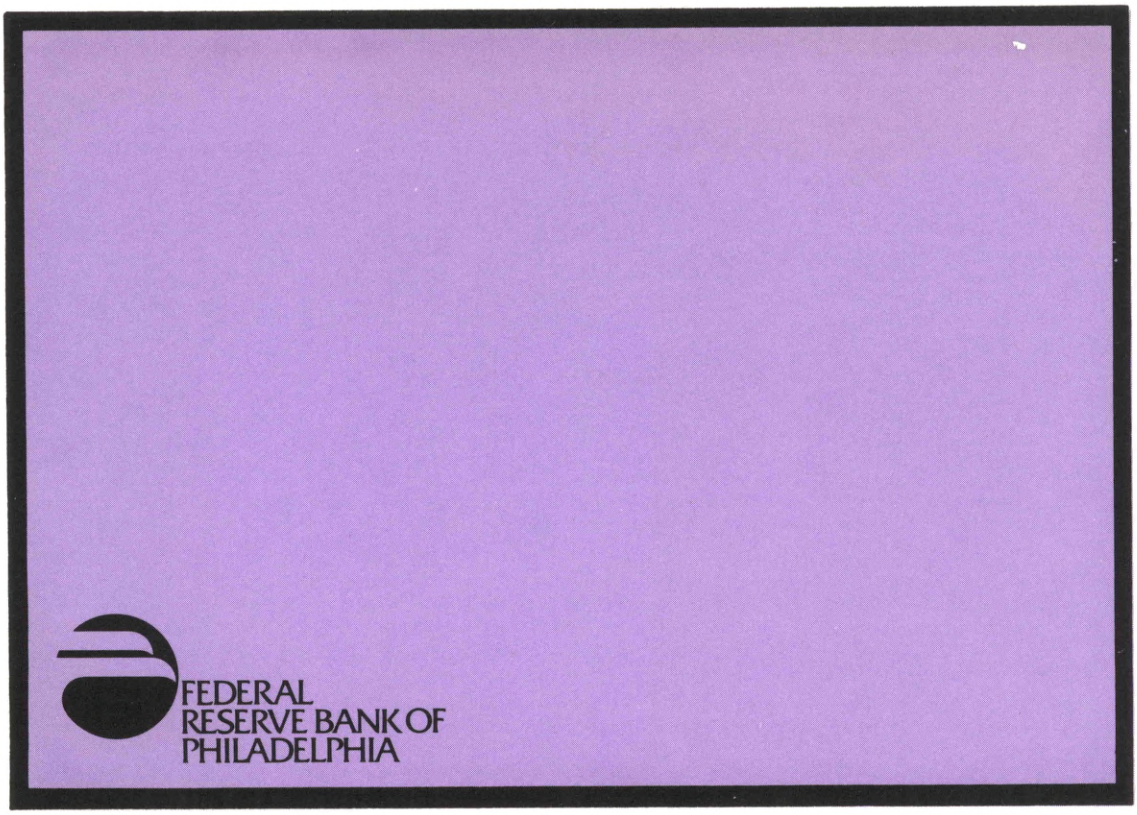
[a]The weights were estimated by applying a Koyck transformation to the geometric distributed lag relationship, regressing the prime rate on the prime rate lagged one week and the current week's CD rate. For a discussion of the estimation of geometric distributed lag models, see Jan Kmenta, *Elements of Econometrics* (New York: Macmillan, 1971), pp. 474-475.

[b]For an alternative interpretation of regression of the prime rate on a distributed lag of current and past CD rates, in which the prime rate reflects the cost of previously issued but still outstanding CD's as well as current CD rates, see Michael A. Goldberg, "The Pricing of the Prime Rate," *Journal of Banking and Finance*, 6 (June, 1982), pp. 277-296. In Goldberg's study the prime rate is linked to banks' average cost of funds, rather than their marginal cost of raising funds from all sources as described in the article.

ESTIMATED WEIGHTS PLACED ON CURRENT AND PAST WEEKS' 3-MONTH CD RATES BY BANKS IN SETTING THE PRIME RATE, 1970-1982



Weights are from regressions of the prime rate on an infinite geometric distributed lag of current and past 3-month CD rates.



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Address Correction Requested