

THE RELATIONSHIP BETWEEN THE DISCOUNT RATE AND THE FEDERAL FUNDS RATE UNDER THE FEDERAL RESERVE'S POST-OCTOBER 6, 1979 OPERATING PROCEDURE*

Alfred Broaddus and Timothy Cook

Federal Reserve bank directors, who are responsible for establishing the discount rate at their respective banks, subject to the approval of the Board of Governors, naturally have a strong interest in the likely effect of discount rate changes on the Federal funds rate. Under the post-October 6, 1979, Federal Reserve operating procedure, changes in the discount rate have typically been followed by changes in the Federal funds rate in the same direction and of roughly the same magnitude, under usual conditions where the funds rate is above the discount rate. For example, an increase in the discount rate of one percentage point has typically been followed by about a one percentage point increase in the funds rate. This relationship between the two rates differs from their relationship in the period before October 6, 1979, when changes in the discount rate did not generally have a significant impact on the funds rate. The purpose of this article is to explain the basic difference between the procedures used in the two periods and to show how this difference has affected the relationship between the funds rate and the discount rate. More broadly, the article attempts to clarify the role of the discount rate in the overall conduct of monetary policy in the post-October 6 operating regime.

1. The Pre-October 6 Procedure

Before October 6, 1979, the Federal Reserve sought to achieve its money supply objectives by manipulating the Federal funds rate directly through open market operations. Under this procedure the Fed first chose a desired funds rate level believed to be consistent with the money supply objective. If the actual funds rate deviated from this level,

the Fed bought or sold U. S. securities in the open market to move the funds rate back to the desired level. In doing so it necessarily increased or decreased the outstanding level of nonborrowed reserves—that is, the level of reserves held by banks other than those borrowed at the discount window—but the magnitude of these changes received little attention.

The key point to keep in mind about the pre-October 6 procedure is that under this procedure the Fed fixed the funds rate within very narrow limits in the short run. In this situation, sustained changes in the spread between the funds rate and the discount rate were possible following a change in the discount rate. To see this, assume that the funds rate was above the discount rate. When the Fed changed the discount rate, the change affected the spread between the funds rate and the discount rate, and the change in the spread, in turn, affected the proportion of its total reserve need the banking system borrowed at the discount window. (A reduction in the discount rate increased borrowing and vice-versa.) If nothing else had happened, this change in borrowing would have affected activity in the Federal funds market and therefore would have affected the funds rate. Under the old procedure, however, the Fed varied the supply of nonborrowed reserves to whatever extent was necessary to keep the funds rate at the desired level. In brief, under the old procedure, changes in the discount rate affected (1) the spread between the funds rate and the discount rate and (2) the allocation of total reserves between borrowed reserves and nonborrowed reserves. They did not significantly affect the funds rate.

The following example may help to clarify these points. Suppose that under the old procedure the Fed was fixing the funds rate at 12 percent and the discount rate was 10 percent. Suppose further that at this two percentage point spread, commer-

* This paper was prepared as part of a staff presentation to the Board of Directors of the Federal Reserve Bank of Richmond on September 9, 1982.

cial banks in the aggregate were borrowing \$2 billion at the discount window. If the Fed then raised the discount rate to 11 percent, thereby reducing the spread from two percentage points to one point, the interest cost advantage of borrowing temporarily at the discount window instead of buying funds in the funds market would diminish. As a result, banks would reduce their borrowing at the window and increase their purchases of funds in the Federal funds market. The increased purchases of Federal funds, in turn, would put upward pressure on the funds rate. In order to keep the funds rate at its desired level, the Fed would supply additional nonborrowed reserves through open market operations. The final result would be a reduction in the spread between the funds rate and the discount rate and a reduction in the proportion of the banking system's total reserve need supplied through the window, but no significant change in the funds rate.

2. The Post-October 6 Procedure

It is important to understand what the October 6 change did and did not involve. The change was **not** a move to a procedure in which the Fed controls the money supply by manipulating the supply of total reserves. The Fed cannot manipulate the supply of total reserves in the current statement week under present arrangements due to the present system of lagged reserve accounting. With lagged reserve accounting, total reserves in a given statement week—the bulk of which are required reserves—are essentially predetermined by the level of deposits two weeks earlier.

Because of lagged reserve accounting, the Fed still affects the money supply primarily through the Federal funds rate under the current procedure.¹ Nonetheless, the post-October 6 procedure differs significantly from the old one. Under the new procedure the Fed does not set specific short-run objectives for the funds rate. Instead, it sets a short-run target for nonborrowed reserves believed to be consistent with money supply objectives. Since the level of total reserves that the banking system must hold in a given statement week is essentially predetermined under lagged reserve accounting,² the selection of a target

¹For a more complete description of the mechanism of monetary control under the new procedure, see Robert D. Laurent, "Lagged Reserve Accounting and the Fed's New Operating Procedure," *Economic Perspectives*, Federal Reserve Bank of Chicago (Midyear 1982), pp. 32-43.

²This statement assumes that the banking system's demand for excess reserves is small, which has generally been the case in recent years.

for nonborrowed reserves for a given statement week implies a particular level of borrowed reserves in that week. Because, as noted above, the demand for borrowed reserves depends on the spread between the funds rate and the discount rate, the implied level of borrowing in a particular statement week will be consistent with a particular, spread. Therefore, under the new procedure the choice of a nonborrowed reserve target strongly influences the spread between the funds rate and the discount rate in the current statement week.^{3,4} It follows that if the discount rate is changed, the funds rate must change by a roughly equal amount to re-establish the spread between the funds rate and the discount rate that is consistent with the borrowing level implied by the nonborrowed reserve target. If the implied level of borrowing changes significantly in subsequent weeks, both the spread and the funds rate will change. Alternatively, if the implied level of borrowing remains roughly the same, both the spread and the new level of the funds rate will be maintained.

Consider again the above example of a 12 percent funds rate and a 10 percent discount rate. Assume further that the level of borrowing implied by the nonborrowed reserves target is \$2 billion. Suppose again that the Fed raises the discount rate to 11 percent. Initially, the increase in the discount rate would again reduce the spread between the funds rate and the discount rate from two percentage points to one point, which would again reduce the interest cost advantage of borrowing at the window relative to buying funds in the Federal funds market. Consequently, desired borrowing at the window would decline initially below the \$2 billion level, and banks would attempt to meet their reserve needs by purchasing funds in the Federal funds market. With the supply of nonborrowed reserves fixed at the target level, however, the increased demand for Federal funds would put upward pressure on the funds rate. It seems reasonable to expect that the funds rate would have to rise to roughly 13 percent, which would re-establish the two-point spread that "had brought forth \$2 billion of borrowing before the discount rate was changed.

³The discussion in this section assumes there is a non-negligible level of borrowing, which normally implies that the funds rate will exceed the discount rate. Sections 3 and 4 of this paper discuss how the present procedure works where the funds rate is below the discount rate.

⁴Under this procedure, if the money supply departs from its path, and the nonborrowed reserve target is not changed; the implied level of borrowing, the spread, and the funds rate would all change in a way that would tend to bring money back to path over time.

To summarize, under the *pre*-October 6 procedure the Fed fixed the funds rate within narrow limits, and a change in the discount rate led to (1) a sustained change in the spread between the funds rate and the discount rate and (2) a change in the allocation of total reserves between borrowed reserves and nonborrowed reserves. Under the *post*-October 6 procedure, the Fed sets targets for nonborrowed reserves, and, a change in the discount rate causes the funds rate to change by about the same amount in the short run. Since the funds rate is the central channel through which the Fed affects the money supply under both procedures, it is obvious that the role of discount rate changes in the overall monetary control process differs significantly between the two procedures. Under the *pre*-October 6 procedure, a discount rate change did not affect the funds rate. Therefore, discount rate changes were of secondary importance in the monetary control process, although they may have had so-called "announcement" effects in the financial markets. Under the *post*-October 6 procedure, a change in the discount rate produces an approximately one-for-one change in the funds rate in the absence of a significant change in the level of borrowing implied by the nonborrowed reserve target. Therefore, discount rate changes play a more important role in the monetary control process in the present set-up. Further, these differences imply that the rationale for discount rate changes will differ between the two procedures. For example, if the funds rate was substantially above the discount rate in the *pre*-October 6 regime, one might recommend an increase in the discount rate to bring it into better alignment with the funds rate and other market rates. This rationale, however, would be much less applicable under the new procedure.

3. The Post-October 6 Procedure with Negligible Borrowing

The above description of the effect of discount rate changes on the Federal funds rate under the *post*-October 6 operating procedure is only valid in the more normal case where borrowed reserves are above a negligible level. On several occasions in the *post*-October 6 period, however, borrowing has dropped to negligible levels, and the funds rate has fallen below the discount rate. In this situation, discount rate changes should not affect the funds rate. (This statement and some of the following statements are subject to qualification as explained in the next section.) Suppose, for example, that the discount rate is 10 percent and the funds rate is 9 per-

cent. In these circumstances, few if any banks would borrow at the window for adjustment purposes since the cost of doing so would exceed the cost of purchasing funds in the Federal funds market. A reduction in the discount rate to, say, 9½ percent would leave the discount rate above the funds rate and would not have a significant effect on either the demand for borrowed reserves or the level of purchases in the Federal funds market. Hence, any effect on the funds rate would be small, and the spread between the discount rate and the funds rate would narrow. More generally, when borrowing is negligible and the funds rate drops below the discount rate under the current procedure, the role of the discount rate is similar to its role under the old procedure.⁵

4. Tiering in the Federal Funds Market

There is, unfortunately, an additional complication that has to be mentioned in discussing the relationship between the discount rate and the Federal funds rate under the *post*-October 6 procedure. This complication was of practical importance in August 1982⁶ when borrowing at the discount window was in the \$300-\$500 million range, even though the funds rate was below the discount rate. The relevant questions are: (1) why was there so much borrowing at the window when it appeared to be cheaper to buy funds in the Federal funds market than to borrow them at the window, and (2) what did this situation imply for the impact of discount rate changes on the funds rate?

A plausible answer to the first question is that some degree of "tiering" existed in the Federal funds market at that time: that is, some banks could purchase funds only at a premium above the going rate. There is evidence, in fact, that some banks may have been paying premiums as high as 100 basis points in this period. In these circumstances, banks forced to pay a premium might have found it advantageous to borrow at the window even though the funds rate quoted in the market was below the discount rate. As an example, suppose the funds rate is 9½ percent and the discount rate is 10 percent but that there are several banks that can borrow only at a

⁵For empirical evidence on the differential effect on the funds rate of (1) discount rate increases when the funds rate is above the discount rate versus (2) discount rate decreases when the funds rate is below the discount rate, see Gordon H. Sellon, Jr. and Diane Seibert, "The Discount Rate: Experience Under Reserve Targeting," *Economic Review*, Federal Reserve Bank of Kansas City (September/October 1982).

⁶The period referred to here includes the statement weeks ending July 28 through August 25.

premium ranging from 0 to 100 basis points. In this situation banks that have to pay premiums exceeding 50 basis points will find the discount window more attractive than the funds market. In such a case borrowing of, say, \$300 million might be consistent with a negative spread between the quoted funds rate and the discount rate.

In the presence of tiering and with borrowing above a negligible level, a reduction in the discount rate should cause the funds rate to decline even if it were already below the discount rate. The mechanism is the same as that outlined in the discussion in section 2 above. Returning to the example in the preceding paragraph, a reduction in the discount rate to 9½ percent would initially increase the demand for borrowed reserves at the window because all banks paying any premium in the Federal funds market would then find it less costly to borrow temporarily at the window. With the nonborrowed reserve target and therefore the supply of nonborrowed reserves unchanged, however, the funds rate would come under downward pressure.⁷

⁷A second possible explanation for nonnegligible borrowing levels when the funds rate is below the discount is that the borrowing is not interest-sensitive adjustment borrowing, but borrowing of a longer term nature that is insensitive to the spread between the funds rate and the discount rate. Such borrowing might include, for example, borrowing by banks that have been denied access to the Federal funds market because they are perceived to be high credit risks. In principle, the target for nonborrowed reserves should include the full amount of interest-insensitive borrowing in each statement week. In practice, such borrowing, when it arises, is not always included immediately in the target. If all of the borrowed reserves in a particular statement week were interest-insensitive, a change in the discount rate would have no

5. Summary of the Role of the Discount Rate in the Post-October 6 Regime

To summarize, when the Fed sets nonborrowed reserve targets, as it does under the post-October 6 procedure, changes in the discount rate will probably cause roughly equal changes in the Federal funds rate when the funds rate is above the discount rate. If borrowing drops to a negligible level, however, and the funds rate falls below the discount rate, discount rate changes will probably not affect the funds rate significantly. When the quoted funds rate is below the discount rate but there is a nonnegligible level of borrowing, such borrowing probably reflects tiering in the Federal funds market. In this situation the impact of a change in the discount rate on the funds rate should be similar to the case when the funds rate is above the discount rate.

While it is possible to delineate these three cases from an analytical standpoint, it is not always easy to do so in practice. In particular, it may be difficult at times to specify the point at which borrowing has reached a “negligible” level where all borrowing is of an interest-insensitive nature. For this reason it may be difficult to predict the effect of a discount rate change on the funds rate when borrowing is at a low level and the funds rate is below the discount rate.

effect on the funds rate. This case is essentially equivalent to the situation discussed in the third section of this article where adjustment borrowing is negligible. If the borrowing in a given week were a mixture of interest-insensitive borrowing and interest-sensitive borrowing due to tiering, discount rate changes would affect the funds rate as discussed in the present section.