

# The discount rate—will it float?

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Since the Federal Reserve adopted its new reserves-oriented operating procedure on October 6, 1979, the role of discount policy has come under greater scrutiny both inside and outside the System. Of special interest has been the spread between the federal funds rate and the discount rate. There is a strong positive association between the federal funds rate-discount rate spread and the amount of reserve adjustment borrowing from the Federal Reserve.<sup>1</sup>

Some analysts have criticized the Fed for allowing this spread to widen as much as it has on certain occasions. They argue that the wide spread induces depository institutions (hereafter referred to as banks) to borrow reserves from the Fed at what might be considered a subsidy rate. In their view banks' increased incentive to borrow from the discount window when the discount rate is low relative to money-market rates diminishes the Fed's control over total reserves and, thus, the money supply. In order to keep the spread between money-market rates and the discount rate smaller and more stable, it has been suggested that the discount rate be allowed to float with a money-market rate such as the federal funds rate. This article explains the discount mechanism and discusses the implications of a floating discount rate within the current framework of reserve accounting and open market operating procedure—namely, lagged reserve accounting and nonborrowed reserve targeting.

## The discount mechanism

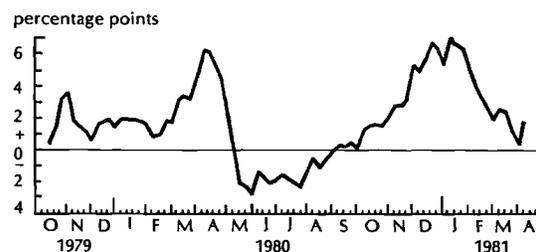
Under the system of lagged reserve accounting adopted in 1968, the average level of reserves that a bank is required to hold as a deposit at the Fed and/or in vault cash in a

<sup>1</sup>Reserve adjustment borrowing excludes seasonal and special borrowing.

## As reserve adjustment borrowing from the Fed rises . . .



## . . . the spread between the federal funds rate and the discount rate increases



given reserve settlement week is determined by the reserve requirement ratios (set by the Fed) applied to the average level of the bank's reservable liabilities two weeks prior. Thus, changes in a bank's deposits and other reservable liabilities during the current reserve settlement week cannot change its required reserves for this week. Upon entering the settlement week, each bank knows the average level of reserves it must hold in order to satisfy its reserve requirements and the Fed knows what average level of reserves it must supply so that the banking system can satisfy its reserve requirements.

Reserves can be supplied in two ways—through Fed open market operations (nonborrowed reserves)<sup>2</sup> and through discount window lending (borrowed reserves). Any shortfall in nonborrowed reserves compared

<sup>2</sup>So-called market factors such as float also provide nonborrowed reserves. The Fed attempts to offset undesired changes in nonborrowed reserves caused by market factors through open market operations.

to required reserves must be made up by borrowed reserves.<sup>3</sup> Under the Fed's new operating procedure, open market operations are conducted so as to hit a targeted level of nonborrowed reserves on a weekly average basis. Since required reserves are predetermined in any given week because of lagged reserve accounting, the choice of a weekly level of nonborrowed reserves largely determines the weekly level of borrowed reserves.<sup>4</sup>

Although the weekly amount of borrowed reserves for the banking system is determined once the Fed chooses a nonborrowed reserve target, borrowings by individual banks from the discount window are not. An individual bank can obtain reserves in several alternative ways, including purchasing federal funds, selling CDs, or selling a security from its portfolio. These alternatives redistribute the existing quantity of reserves among banks. They do not increase the reserves of the banking system as a whole. In contrast, borrowing from the Fed increases both the borrowing bank's reserves and those of the banking system.

If a bank could borrow from the Fed as much and as often as it desired at the discount rate, then the discount rate would serve as a cap to the federal funds rate. The fact that the federal funds rate is usually above the discount rate when nonborrowed reserves are less than required reserves is *prima facie* evidence that the discount rate does not measure the full cost of borrowing from the Fed. The full cost of borrowing from the Fed, or

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<sup>3</sup>This abstracts from reserve carryover, the privilege banks have of carrying over a surplus or deficiency of up to 2 percent of required reserves into the following reserve settlement week.

<sup>4</sup>If banks' demand for excess reserves (i.e., reserves in excess of those required) were zero or constant, then the choice of a weekly level of nonborrowed reserves completely determines the weekly level of borrowed reserves. To the degree that banks' demand for excess reserves varies, then a given weekly level of nonborrowed reserves does not completely determine a weekly level of borrowed reserves. Because excess reserves tend to be relatively small and stable, the analysis is not materially affected by them and, therefore, it will be assumed that they are zero.

the effective discount rate, is the sum of the quoted discount rate plus the nonpecuniary costs resulting from discount window administration. Because the Fed tries to limit the amount and duration of borrowing by individual banks, by subjecting their lending and investment practices to "surveillance," and because banks wish to assure themselves access to the window in the future when they may face liquidity problems, the nonpecuniary costs of borrowing an additional dollar rise with the quantity and frequency of borrowing by an individual bank. These costs would rise even with an unchanged level of borrowing if the administration of the discount window were to get "tougher."

To minimize its costs, an individual bank will manage its reserve position in such a way that the effective discount rate on an additional dollar borrowed from the Fed will be equal to the cost of acquiring reserves from alternative sources. At the margin, then, there is no subsidy involved in borrowing from the Fed when the effective rather than the quoted discount rate is compared with the cost of alternative sources of funds.<sup>5</sup> Because borrowing federal funds is a substitute for borrowing at the discount window, this cost can be measured by the federal funds rate. Thus, the effective discount rate tends toward equality with the federal funds rate, and the spread between the federal funds rate and the quoted discount rate measures the marginal nonpecuniary cost of borrowing from the Fed.

If the Fed provides less nonborrowed reserves than required, then those banks for which the effective discount rate is higher than the costs of alternative sources of funds will attempt to obtain reserves from these sources, thereby driving up their interest rates. Some reserve-deficient banks will be induced to increase their borrowings from

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<sup>5</sup>However, there is a subsidy on average because the full nonpecuniary costs of borrowing are incurred only on the last dollar borrowed; on the intramarginal borrowing the bank incurs below-market costs. For monetary policy purposes, of course, it is only the marginal cost that is relevant.

the Fed as the alternative cost of funds rises to the level of their effective discount rates. Interest rates will continue to rise until banks are induced to borrow enough from the Fed to meet their required reserves. This rising cost of reserves will eventually cause banks to curtail the expansion of their assets and, hence, slow the growth of the money supply.

It can be seen, then, that a penalty discount rate policy—i.e., a policy whereby the Fed always maintains the quoted discount rate above the current federal funds rate—is theoretically inconsistent with lagged reserve accounting and nonborrowed reserve targeting. The way in which the market for bank reserves comes into equilibrium when the level of nonborrowed reserves is set below that of required reserves is for the federal funds rate to rise to a level above the quoted discount rate such that individual banks are induced to borrow enough reserves from the Fed to eliminate the reserve deficiency for the banking system. A penalty discount rate would prevent the reserves market from reaching equilibrium because no bank would be willing to borrow from the Fed as long as it could obtain reserves in the federal funds market at a rate below the discount rate. The federal funds rate would continue to ratchet upward until the Fed provided additional nonborrowed reserves (i.e., above the targeted level) to eliminate the reserve deficiency.<sup>6</sup>

With contemporaneous reserve accounting where the current week's required reserves are determined by the current week's reservable liabilities, a penalty discount rate would, in theory, be feasible and would be equivalent to the Fed closing down the discount window for reserve adjustment borrowing. As the federal funds rate rose and banks sold securities to the nonbank public in order to acquire reserves, reservable liabilities of the banking system would decline and, thus, reduce the current week's required reserves. The federal funds rate would continue to rise

<sup>6</sup>Alternatively, at some level of rates, banks might bid so aggressively for deposits as to attract currency out of circulation, which the banks could then ship to the Fed to meet their reserve requirements in the current week.

until reservable liabilities declined to the point where required reserves were reduced to a level equal to nonborrowed reserves.<sup>7</sup> In practice, sharp increases in the federal funds rate might occur so as to induce banks to make the portfolio adjustments necessary to reduce required reserves to the targeted level of nonborrowed (and in this case, total) reserves in as short a time as a week.

### Floating the discount rate

As mentioned at the outset, some analysts have suggested that the quoted discount rate be allowed to float with a particular money-market rate (e.g., the federal funds rate) or some composite index of money-market rates in order to keep the spread between market rates and the discount rate more stable. For example, the quoted discount rate in the current week might be set at 50 basis points (0.5 percentage points) above the previous week's average federal funds rate. But it has been seen that the spread between the federal funds rate and the quoted discount rate in the current week depends critically on the amount of borrowing forced on the banking system by the Fed's choice of a nonborrowed reserves target and the attendant nonpecuniary costs of such borrowing. Floating the discount rate would have no impact on the stability of the federal funds rate-discount rate spread.

Floating the discount rate would, however, have important implications for the behavior of the federal funds rate and other related interest rates in a framework of lagged reserve accounting and nonborrowed reserve targeting. Consider the following two relationships:

$$(1) (RFF_t - RD_t) = cBR_t + e, \quad c > 0, \quad BR_t > 0$$

$$(2) RD_t = RFF_{t-1} + K,$$

<sup>7</sup>Under lagged reserve accounting, the rising federal funds rate would also cause the current week's reservable liabilities to fall, but this would have no effect on the current week's required reserves.

where RFF is the federal funds rate, RD is the discount rate, c is the coefficient reflecting the marginal nonpecuniary costs of borrowing from the Fed, BR is borrowed reserves (dollars), e is an error term, K is a constant (percentage points) and t refers to the time period (e.g., week). The first relationship says that the spread (in percentage points) between the current federal funds rate and current discount rate is an increasing function of the amount of reserves borrowed by the banking system from the Fed. The second relationship is a formula for floating the discount rate. The constant K can be assigned positive, negative, or zero values. Substituting (2) into (1) and ignoring e yields the following relationship:

$$(3) \text{ RFF}_t - \text{RFF}_{t-1} - K = c\text{BR}_t.$$

This can be rearranged as:

$$(3a) \text{ RFF}_t - \text{RFF}_{t-1} = c\text{BR}_t + K.$$

If K is positive, i.e., the current period's discount rate is set above the previous period's federal funds rate, then relationship (3a) implies that the current period's federal funds rate will always be higher than the previous period's so long as the banking system is forced to borrow from the Fed. This implication also applies if K is zero. Thus, even if borrowing from the Fed were declining, the federal funds rate would ratchet upward until banks' deposits and other reservable liabilities slowed enough to cause required reserves to fall below the Fed's nonborrowed reserve path, at which point the federal funds rate would fall rapidly toward zero.<sup>9</sup> The discount rate, being tied to the federal funds rate, would also plummet. As soon as banks were once more forced to borrow from the Fed,

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<sup>9</sup>Relationship (1) above applies only when borrowed reserves are greater than zero. For a detailed discussion of why the federal funds rate falls rapidly toward zero as nonborrowed reserves are increased above required reserves, i.e., borrowed reserves are zero, see Robert D. Laurent, "A Critique of the Federal Reserve's New Operating Procedure," *Staff Memoranda* No. 81-4 (Federal Reserve Bank of Chicago, forthcoming).

the federal funds rate and the discount rate would start to ratchet up again.<sup>9</sup>

A somewhat different result is possible if K is negative, i.e., the current period's discount rate is less than the previous period's federal funds rate. If borrowed reserves are less than (or equal to) some critical value, then the federal funds rate need not rise continuously but could decline (or remain constant) from period to period. This critical value can be obtained from relationship (3a). These conditions may be stated as:

$$(4) \text{ RFF}_t - \text{RFF}_{t-1} \geq 0 \text{ as } \text{BR}_t \geq \frac{-K}{c}.$$

The critical value, then, is  $-K/c$  (remember, in this case,  $K < 0$  so  $-K > 0$ ). If borrowed reserves had been above the critical value and, for some reason, fell below, then the federal funds rate could decline.

## Conclusion

Floating the discount rate, then, would not necessarily keep the federal funds rate-discount rate spread more stable, but because of its possible upward ratcheting effect on the federal funds rate, it could tend to produce quicker bank portfolio and deposit responses than would be the case under a more constant discount rate policy.

There remains the question whether the benefits of the more rapid deposit responses resulting from a floating discount rate policy would be greater than the costs of the consequent increased interest rate volatility.<sup>10</sup>

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<sup>9</sup>This analysis assumes that the Fed adheres to its nonborrowed reserves path without any interest rate constraints being self-imposed. Notice that even with a constant as opposed to floating discount rate, a nonborrowed reserves targeting policy implies a very sharp drop in the federal funds rate once nonborrowed reserves are greater than required reserves. However, the constant discount rate policy does not imply a continuously rising federal funds rate when nonborrowed reserves are less than required reserves.

<sup>10</sup>For a discussion of the social costs of interest rate volatility, see Paul L. Kasriel, "Interest Rate Volatility in 1980," *Economic Perspectives*, Federal Reserve Bank of Chicago, (January/February 1981), pp. 16-17.