# The Discount Rate: The Other Tool of Monetary Policy

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Open market operations—purchases and sales of government securities—are clearly the primary tool of monetary policy. The aggregative effect of changes in the discount rate or in reserve requirements can easily be swamped by a sufficient volume of open market operations. Nonetheless, for several reasons, the discount rate is not simply an irrelevant ornament in the standard list of the tools of monetary policy.

First, changes in the discount rate may influence current open market operations or signal a future change in monetary policy. For example, under a strict borrowed reserves operating regime, the targeted level of borrowing determines the difference between the federal funds rate and the discount rate, and a change in the discount rate can be expected to pass fully through to the federal funds rate, so long as the borrowing target remains unchanged. Previous research on the effect of the discount rate on open market operations has reached mixed conclusions.[1]

Second, because the discount rate is an administered rate that has been moved in discrete steps ranging from 25 to 100 basis points, it is less volatile and more visible than most other short-term money market rates, with the possible exception of the prime rate. Changes in the discount rate are reputed to have an "announcement effect"—more like the banging of a gong than the ringing of a doorbell. Moreover, movements in the discount rate tend to persist in the same direction. As will be illustrated below, the past 20 years have exhibited four (or perhaps only three) discount rate cycles.

Finally, changes in the discount rate may contain different information than changes in open market operations because the two policy tools are determined in different ways. Open market policy is determined by the voting members of the Federal Open Market Committee—the seven members of the Board of Governors of the Federal Reserve System and five of the Reserve Bank presidents. The discount rate is

determined by a more complex, or at least less familiar, two-step process: the board of directors of each of the 12 Federal Reserve Banks meets, as required by law, no less frequently than every two weeks, to propose a discount rate. The results of their deliberations are conveyed to the Board of Governors in Washington. The Board of Governors may deny, approve, or table the proposals made by the Reserve Banks' boards of directors.[2]

The two-step procedure is an example of a system of checks and balances, a compromise between a centralized and a federal distribution of power. No Reserve Bank can change its rate without Board of Governors approval, but because, in practice, Reserve Banks initiate changes, the Board could favor a rate other than the prevailing one.[3] This unusual, rather subtle procedure leaves the Board with full control and the Reserve Banks with no control of the exact timing of changes. A Reserve Bank may wish to propose a change either if it would like to see an immediate change or if it expects a change might be desirable in the near future. In deciding on the precise timing of the change, the Board is in a position to respond rapidly to sudden or unexpected incoming information. Only the Board, for example, is in a position to take account of understandings with foreign central banks.

*The discount rate procedure is an example of a system of checks and balances.*

In extreme cases, the initiative for changing the rate is fairly clear. On occasion, the Board of Governors has favored a change and, because no proposals for change had been submitted, has made known its willingness to approve a proposal. On July 19, 1979, for example, the Board of Governors received a proposal from the New York Bank and approved it the same day. At the other extreme, on two occasions in the past 20 years, the Board of Governors did not act until it had received proposals from all 12 Reserve Banks (April 1973 and October 1977). In these cases it seems reasonable to conclude that the initiative for the change sprang from the Reserve Banks rather than the Board of Governors!

These cases were chosen to illustrate the extremes. More typically, determination of the discount rate stems from an interactive nonadversarial process in which one (or more) Reserve Bank(s) first proposes a change and the Board disposes. More than three-quarters of discount rate changes in the last 20 years have been made when between four and 10 Reserve Banks have proposed the change.

The focus of this article is the process by which the discount rate is determined. It starts with a summary description of the 12 Reserve Banks' proposals, culled from the Board of Governors' minutes over the past 20 years. It then turns to a chronological history of Reserve Bank proposals and actual changes. It next attempts to model formally the decision procedures of the 12 Reserve Banks. It concludes by presenting a formal statistical model of how the Board of Governors has disposed of the Reserve Banks' discount rate recommendations.

## I. Reserve Banks' Discount Rate Proposals

The propensity to propose discount rate changes has varied both among Reserve Banks and over time. As shown in Table 1, column 1, over the past 20 years Dallas has been the most frequent proponent of changes in the discount rate, having a proposal on the table at nearly one-third of the meetings of the Board of Governors, more than twice as frequently as several other Banks.[4] But that has not always been true: in the first 10-year period, Chicago was the most active Reserve Bank and Dallas was among the least active (column 2). Dallas is the only Bank whose activism clearly increased in the last 10 years (column 4). The sharp increase in Dallas's activism has been roughly offset by the reduced activism at most other Reserve Banks, especially those in the Kansas City, Atlanta, and Chicago Districts, leaving the average

[1] See Roley and Troll (1984), Smirlock and Yawitz (1985), Cook and Hahn (1988), Dueker (1992), and Wagster (1993).

[2] In early 1988, tabling was replaced by the more informal procedure—which requires no vote—of simply "maintaining" the existing rate when neither approval or disapproval of a request is voted. Because "tabling" prevailed over most of the period under investigation, that term will be used here to also describe the determinations to maintain the existing rate in recent years.

[3] The Board of Governors may have the power to require the establishment of a particular discount rate even in the absence of a Reserve Bank proposal. This power has apparently not been exercised since 1927, when the Board imposed a rate reduction on the reluctant Chicago Reserve Bank.

[4] The Reserve Bank discount rate proposals in this paper were taken from the minutes of the meetings of the Board of Governors in the 20-year period from January 1973 through December 1992.

Table 1
*Reserve Bank Activism: Proposals to Change the Discount Rate*
Percentage of Meetings

| Reserve Bank | 1973–92 (1) | 1973–82 (2) | 1983–92 (3) | Difference (4) = (3) − (2) | Proposal Submitted at Time of Approval[a] (5) |
|---|---|---|---|---|---|
| Dallas | 29 | 15 | 41 | 26 | 54 |
| Chicago | 25 | 31 | 20 | −11 | 68 |
| Cleveland | 21 | 21 | 21 | 0 | 44 |
| San Francisco | 21 | 24 | 19 | −5 | 59 |
| Atlanta | 21 | 28 | 15 | −13 | 48 |
| Boston | 19 | 19 | 20 | 1 | 62 |
| St. Louis | 16 | 20 | 12 | −8 | 40 |
| New York | 14 | 15 | 13 | −2 | 75 |
| Kansas City | 14 | 22 | 7 | −15 | 56 |
| Philadelphia | 13 | 16 | 11 | −5 | 59 |
| Minneapolis | 12 | 15 | 9 | −6 | 49 |
| Richmond | 11 | 13 | 10 | −3 | 44 |
| Average | 18 | 20 | 17 | −3 | 55 |

Note: Ordering based on column (1).
[a]Column (5) is the percentage of all discount rate changes.
Source: Minutes of meetings of the Board of Governors of the Federal Reserve System, compiled at the Federal Reserve Bank of Boston.

frequency of recommendations for change by a Reserve Bank fairly stable over time, at about 20 percent. The existence of long periods with no proposals for change affects the choice of statistical method used below to examine the determinants of discount rate proposals.

Activism is, of course, not a reliable proxy for "effectiveness" or "influence." It is easy to imagine a very active Bank that always recommended the same thing or always was out of sync with broader sentiment and, thus, would have little influence on the discount rate. Similarly, it is easy to imagine a Bank that made few proposals but whose proposals were a reliable precursor of the future discount rate.

Column 5 of Table 1 shows the frequency with which each Bank had submitted a proposal at the time when the discount rate was changed. The raw data were adjusted to include those occasions when a Reserve Bank had previously proposed the change but it had been denied or tabled, and the Directors had not yet met again before the change was made.[5] The table reveals that New York and St. Louis had the extreme positions—New York had submitted a proposal to change in the case of 75 percent of the actual changes, whereas St. Louis had submitted a proposal for change only 40 percent of the times when changes were made.

The fact that New York was most frequently among the group of Banks whose requests were approved does not prove that New York's proposal was the most influential. Banks often join in well after the sentiment for change has been well established. In an important sense, the Reserve Bank that *first* proposes a change may be better described as the initiator of the change that subsequently occurs.

Table 2 provides information about which Reserve Banks first proposed a discount rate change in the same direction as the subsequent actual change. The left half of the table gives the number of times each Bank was the first (column 1), among the first (column 2), and either first or among the first (column 3) to propose the direction of the next change in the discount rate. Chicago was most frequently the first and New York least frequently the first to propose change.

This way of ranking suffers, however, from the problem that nearly one-third of the time, the first

[5] For example, Kansas City had proposed a 50-basis-point increase in the discount rate, which the Board of Governors denied at its June 25, 1973 meeting; the Board denied a similar request from Boston the next day. Yet, when the Board approved five Banks' requests for an increase on June 29, 1973, neither Kansas City nor Boston was among those whose proposals were approved because their directors had not met again in the time between the denial and the acceptance. It seems reasonable to assume that each Bank still favored its previous proposal, and so both Banks are counted as having favored the increase that occurred.

Table 2
*Reserve Bank Leaders: Direction Only of Discount Rate Change, 1973 to 1992*
Number of Proposals

| | Ignoring Interruptions | | | Uninterrupted | | |
|---|---|---|---|---|---|---|
| | First | Among First | Total | First | Among First | Total |
| Reserve Bank | (1) | (2) | (3) | (4) | (5) | (6) |
| Chicago | 6 | 15 | 21 | 7 | 14 | 21 |
| Dallas | 3 | 14 | 17 | 2 | 14 | 16 |
| Boston | 8 | 7 | 15 | 8 | 6 | 14 |
| San Francisco | 3 | 10 | 13 | 3 | 11 | 14 |
| Cleveland | 2 | 8 | 10 | 4 | 9 | 13 |
| Atlanta | 1 | 6 | 7 | 2 | 7 | 9 |
| St. Louis | 2 | 7 | 9 | 1 | 8 | 9 |
| Philadelphia | 2 | 8 | 10 | 1 | 7 | 8 |
| Minneapolis | 3 | 6 | 9 | 2 | 5 | 7 |
| Kansas City | 3 | 4 | 7 | 3 | 2 | 5 |
| New York | 0 | 4 | 4 | 2 | 3 | 5 |
| Richmond | 3 | 4 | 7 | 0 | 3 | 3 |
| All Reserve Banks | 36 | 93 | 129 | 35 | 89 | 124 |
| Average | 3.0 | 7.8 | 10.8 | 2.9 | 7.4 | 10.3 |

Note: Ordering based on column (6), with column (4) as tiebreaker.
Source: See Table 1.

Bank to propose a change fails to resubmit its proposal later. The clearest example of this occurred in late 1981, when San Francisco was the first to propose a 100-basis-point cut in the discount rate. After the San Francisco proposal had twice been tabled by the Board of Governors, it was not submitted again. By February 1982, San Francisco was proposing a 100-basis-point *increase* in the discount rate. It is hard to construe this as a case of San Francisco's influencing the next change in the discount rate, a 50-basis-point *reduction* (July 19, 1982), which the Chicago Bank had been proposing persistently since March of 1982.

To correct for these "interrupted" proposals, the right half of Table 2 presents the number of times each Reserve Bank was first (column 4), among the first (column 5), and either first or among the first (column 6) to persist, *without interruption*, in proposing a change. This seems a more sensible proxy for initial influence or leadership. Note first that the rankings on the right and left sides of Table 2 are little changed when first proposals that subsequently were not repeated are omitted: Chicago, Dallas, Boston, and San Francisco still rank near the top. One exception is Atlanta, relatively seldom the first to propose a change but, because it continues to resubmit its early proposals, fairly typical in first proposing and then maintaining its change proposal. Second, contrast this table with column (5) in Table 1. New York, so frequently included among the Banks whose requests were approved, is seldom among the first to propose a change according to any of these measures. Active Banks like Dallas and Chicago are frequently the first, whereas relatively inactive Reserve Banks like Kansas City and Richmond are seldom first to propose the change.

Table 2 is based solely on the first proposal to change in the actual direction, regardless of the magnitude of change proposed. Some may believe that the magnitude of the proposal is also important. Proposals to change the discount rate have ranged in size from a 300-basis-point increase (by Cleveland on March 31, 1980) to a 200-basis-point decrease (by Chicago, St. Louis, Minneapolis, and Dallas in the spring of 1980), although actual changes have not exceeded 100 basis points since 1920, when the discount rate was once changed by 125 basis points. Virtually all of the proposals to change by 100 basis points or more came in the tumultuous period from October 6, 1979 to early 1982, the period in which the Federal Reserve adopted an operating procedure that allowed for larger changes in short-term interest rates. Since 1982, proposals to change the rate by more than 50 basis points have occurred only three times, in July 1984 when Dallas requested an increase

Table 3
*Reserve Bank Leaders: Direction and Correct Magnitude of Discount Rate Change, 1973 to 1992*
Number of Proposals

| | Ignoring Interruptions | | | Uninterrupted | | |
|---|---|---|---|---|---|---|
| | First | Among First | Total | First | Among First | Total |
| Reserve Bank | (1) | (2) | (3) | (4) | (5) | (6) |
| Chicago | 4 | 15 | 19 | 5 | 13 | 18 |
| Dallas | 3 | 11 | 14 | 3 | 11 | 14 |
| Cleveland | 2 | 10 | 12 | 3 | 11 | 14 |
| Boston | 6 | 7 | 13 | 4 | 8 | 12 |
| New York | 2 | 7 | 9 | 5 | 6 | 11 |
| San Francisco | 1 | 9 | 10 | 2 | 8 | 10 |
| St. Louis | 2 | 10 | 12 | 1 | 9 | 10 |
| Philadelphia | 2 | 9 | 11 | 1 | 9 | 10 |
| Atlanta | 1 | 8 | 9 | 2 | 7 | 9 |
| Richmond | 1 | 9 | 10 | 1 | 8 | 9 |
| Kansas City | 3 | 6 | 9 | 2 | 4 | 6 |
| Minneapolis | 3 | 6 | 9 | 2 | 3 | 5 |
| All Reserve Banks | 30 | 107 | 137 | 31 | 97 | 128 |
| Average | 2.5 | 8.9 | 11.4 | 2.6 | 8.0 | 10.7 |

Note: Ordering based on column (6), with column (4) and column (3) as tiebreakers.
Source: See Table 1.

of 100 basis points, in early 1989 when Cleveland sought a 100-basis-point increase, and in December 1991 when New York and Chicago's proposals for a 100-basis-point reduction were approved.

Table 3 ranks the Reserve Banks in the same way as Table 2 for the first Reserve Bank to propose the correct direction *and* magnitude of the next change in the discount rate. The overall rankings are quite similar, although a few Banks' relative positions do shift. New York, and to some degree Cleveland, are relatively much more successful in being the first to continually propose the direction and magnitude of the change, as opposed to only its direction. In contrast, Atlanta and Minneapolis were relatively less successful in first proposing the correct magnitude and direction rather than simply the direction of the next change.

Omitting interrupted proposals affects the ranking of a few Banks. For example, as shown in Table 2, New York was seldom first to propose the direction of change whether or not discontinued proposals are counted. New York was also seldom the first to propose the correct magnitude (Table 3), but because it was persistent in its proposals, New York was fairly typical in the frequency with which it initiated an uninterrupted proposal of the correct magnitude. New York, like Atlanta, was relatively slow to act, but persistent. Kansas City and Minneapolis show the opposite tendency. They were first to propose the correct magnitude of change nearly as often as the average Reserve Bank. However, because relatively often they did not resubmit these proposals, they were seldom first to propose the correct magnitude on an uninterrupted basis. New York and Atlanta were relatively persistent, whereas Minneapolis and Richmond were somewhat tentative in their messages.

Proposals to change that are not subsequently resubmitted send a weaker, more ambiguous signal than proposals that are offered persistently. Table 4 looks directly at Reserve Banks' tendency to withdraw their proposals, not just at first proposals as shown in Table 3; it distinguishes between proposals not resubmitted after having been tabled by the Board of Governors and those not resubmitted after denial. Denial is commonly thought to suggest that the proposal has little chance for approval in the near future, whereas tabling is essentially noncommittal about prospects for approval.

The first column of Table 4 shows the total number of proposals discontinued. Chicago, one of the most activist Reserve Banks and frequently among the first to propose a change, is also the leader

Table 4
*Withdrawn Discount Rate Proposals, 1973 to 1992*

| | All Withdrawn Proposals | | Withdrawn Proposals in "Correct"[a] Direction | |
|---|---|---|---|---|
| Reserve Bank | Total (1) | Excluding Denials (2) | Total (3) | Excluding Denials (4) |
| Boston | 6 | 1 | 3 | 1 |
| New York | 8 | 4 | 6 | 3 |
| Minneapolis | 7 | 4 | 6 | 4 |
| Kansas City | 11 | 4 | 7 | 3 |
| San Francisco | 18 | 11 | 7 | 4 |
| Richmond | 10 | 4 | 8 | 2 |
| St. Louis | 14 | 4 | 8 | 3 |
| Philadelphia | 12 | 5 | 8 | 3 |
| Cleveland | 19 | 8 | 10 | 2 |
| Atlanta | 16 | 8 | 10 | 3 |
| Dallas | 18 | 10 | 11 | 5 |
| Chicago | 19 | 5 | 13 | 4 |
| All Reserve Banks | 158 | 68 | 97 | 37 |
| Average | 13.2 | 5.7 | 8.1 | 3.1 |

Note: Ordering based on column (3), with column (4) and column (2) as tiebreakers.
[a]"Correct" direction is that of the subsequent actual change.
Source: See Table 1.

in the total number of proposals discontinued. Boston is the least likely to withdraw its proposals.

It can be argued that choosing not to resubmit a denied proposal is not wavering but merely a rational response to the prospects for achieving the desired change. Column (2) shows the number of proposals dropped after having been tabled; it excludes proposals discontinued after denial. By this measure, San Francisco and Dallas change their mind by far the most frequently, whereas Chicago is only about average.

While columns (1) and (2) are measures of the "noisiness" or ambiguity of a Bank's recommendations, only in retrospect can we distinguish between "stubbornness" (proposals to change in the direction opposite to the subsequent actual change) and simple lack of persistence (failure to resubmit proposals in the direction of actual change). Column (3) gives the total number of proposals in the same direction as the next change that were discontinued. Chicago was the most likely, and Boston the least likely, to withdraw its proposal when proposals in the opposite direction from the next change are excluded. This table ranks the Reserve Banks by this measure.

For those who believe withdrawal is the appropriate response to Board of Governors denial, column (4) lists the number of proposals in the same direction as the next change that were withdrawn from the table. Dallas most frequently did not resubmit tabled proposals in the same direction as the next change, while Boston was the most persistent in sticking to its point of view.

As the previous discussion suggests, it is not possible to measure "effectiveness," "influence," or "leadership" without considering whether the proposals were appropriate. This study turns next to proposals in the opposite direction from, or "out of sync" with, the subsequent change. If actual policy were ideal in both timing and magnitude, these proposals could be regarded as "wrong."

Once it is acknowledged, however, that policy mistakes could have been made, some of these out of sync proposals can be regarded as more insightful or more foresighted than the actual policy. Some of these proposals appear defensible, or at least arguable, even in retrospect. Every proposal undoubtedly seems reasonable at the time it is offered, before the fact. Given the great uncertainty that surrounds the economic future, it is always possible to argue that the risk of accelerating inflation warrants policy restraint or that the risk of a recession warrants policy ease. Even if the risks do not materialize, it can often be wise to insure against a risk of sufficient gravity. It is also possible, of course, to spend too much on insurance or to systematically overestimate the risks.

Table 5 presents information on all discount rate proposals that were of the opposite sign from the next actual change. Several of these proposals were entirely appropriate. The clearest example occurred in March 1980, when four Banks proposed increasing the discount rate by 100 basis points and seven Banks proposed increasing the rate by 200 basis points, to 15 percent. Even though the next change in the basic discount rate was a 100-basis-point reduction on May 28, 1980, the Board of Governors' immediate response to the 11 Banks' March recommendation of an increase was the imposition of a surcharge on the discount rate for loans to large banks. Advocates could justifiably argue that their proposals proved in retrospect to be in the correct direction, insofar as the stability of the base rate was more technical or symbolic than substantive.

More debatable cases center on the timing of discount rate changes and the lag in the impact of

Table 5
*"Out of Sync" Discount Rate Proposals, 1973 to 1992*

| Reserve Bank | Total (1) | Excluding Arguable (2) | Least Defensible (3) |
|---|---|---|---|
| Minneapolis | 2 | 0 | 0 |
| New York | 2 | 0 | 0 |
| Boston | 3 | 1 | 0 |
| Chicago | 3 | 1 | 0 |
| Philadelphia | 3 | 1 | 0 |
| Richmond | 3 | 2 | 1 |
| Kansas City | 5 | 3 | 1 |
| Atlanta | 5 | 4 | 1 |
| St. Louis | 5 | 4 | 1 |
| Dallas | 6 | 4 | 1 |
| Cleveland | 6 | 5 | 1 |
| San Francisco | 8 | 6 | 2 |
| All Reserve Banks | 51 | 31 | 8 |

Note: Ordering based on column (2), with column (1) as tiebreaker and alphabetical thereafter.

Frequency Distribution of Proposals

| | |
|---|---|
| 13—1980 | 2—1990 |
| 8—1983 | 2—1988 |
| 6—1976 | 2—1981 |
| 5—1984 | 2—1974 |
| 5—1982 | 1—1975 |
| 4—1987 | 1—1973 |

Source: See Table 1.

monetary policy. In general terms, the history of discount rate changes over the past 20 years can be condensed into four, or perhaps even three, major cycles. The upswings and downswings, discussed in detail in the next section, are illustrated in Figure 1. These cycles suggest dividing "out of sync" proposals to change the discount rate into three categories, each with different severity. The proposals most difficult to understand seem to be those to cut (increase) in the midst of a series of increases (cuts). Here the proposal is clearly at odds with policy that later, with additional information, was adopted as appropriate. It is hard to justify such proposals as simply more farsighted than those of their contemporaries.

A second category of out of sync proposals, which in retrospect seems easier to understand, includes the proposals to extend a series of cuts (or increases) somewhat longer than the Board of Governors chose to do. Is one additional tightening in a period of accelerating inflation clearly a mistake? Is one additional easing toward the end of a period of stagnation really a mistake? Defendants of such a proposal could argue forcefully that the series of moves should have been continued, so long as they acknowledge the need to reverse their proposal at a later date.

A third type of out of sync proposal deals with the opposite concern: should a series of increases (or cuts) be stopped, one step before the final move? Did actual policy persist too long in the same direction?

Specifically, on two occasions, in 1973 and 1983, the out of sync proposals did not reflect the direction of the very next change but were in the same direction as the following *series* of changes. In 1983, seven banks wanted to continue the series of reductions made during the 1981–82 recession. In fact, the next change was the April 1984 increase, but this increase was followed by a series of cuts starting later in 1984. It can be argued that the April 1984 increase—the only example of a single move in one direction since 1971—was a technical change and not a shift in policy. Even if the April 1984 increase were fully justified, it is doubtful that economic history would have to be rewritten if it had not occurred, and if, instead, the seven banks' requests for further cuts in early 1983 had been approved.

Boston's proposals to cut the discount rate in October and November 1973, at the start of the 1973–75 recession, also seem defensible in retrospect. The severity of the oncoming recession did not become evident for several months, but when it did, and when the limited effect of the oil price shock on the inflation rate (as opposed to the price level) became clear, the discount rate was cut seven times. The discount rate increase of April 24, 1974, while defensible at the time, was at least arguable in retrospect, in light of the severity of the remaining portion of the recession. Granting the undesirability of the increases in inflation in the late 1970s, and even the virtues of a tighter monetary policy to restrain that increase, one can argue that the mistake was made later—the continued cuts in 1975 and 1976 or the limited increases in 1977 and 1988.

The remaining columns of Table 5 enumerate these different types of "out of sync" proposals. Column 2 excludes both the 1980 change and the 1973 and 1983 episodes when the proposals anticipated the direction of the series of changes after the next change. The final column (3) also excludes proposals to extend a series of changes longer than it was in fact extended. It consists only of proposals to change in the midst of a series of changes in the opposite direction (1973, 1982, and 1988).

Interpretations of the information in Table 5

obviously depend on one's view of the appropriate policy goals and one's concept of the way monetary policy influences policy goals. If monetary policy had no impact on economic activity and its only goal were price-level stability, then whenever inflation was positive, an easier policy would be a mistake. If inflation came only from excess demand pressure, tightening would be inappropriate whenever slack occurred.

Table 6 highlights the fact that different Banks have taken different policy views. The table shows the proportion of each Reserve Bank's proposals to change the discount rate that consisted of proposals to increase the rate—this will be referred to here as the Bank's "policy stance." For example, over the entire period, 90 percent of the St. Louis proposals to change the discount rate were proposals to increase the rate. In contrast, only 18 percent of the Dallas proposals were for increases.

Policy stance has varied over time as well as among Banks. Over the entire period, all Reserve Bank proposals combined were evenly split between increases and decreases. In the 1973–82 period of accelerating inflation, proposals to increase dominated (59 percent). In the 1983–92 period of generally decelerating inflation, only 43 percent of the proposals were for increases. Four Banks ran contrary to this general trend: St. Louis, Cleveland, and Richmond maintained a fairly stable policy stance over time. Only Philadelphia's policy stance shifted substantially toward more increases in the later period.

Although suggestive, this table cannot be used to definitively label individual Reserve Banks as liberal or conservative, hawk or dove. A vote to increase rates meant something different in 1979, when inflation was accelerating, than it did in 1982, when the economy was in a recession. Moreover, as the table implies, a Bank's policy preferences or its concept of how policy affects its goals may change over time. This suggests a need to place discount rate proposals in a concrete historical context. The next section is devoted to that task.

Table 6
*Reserve Banks' Policy Stance: Proposals to Increase the Discount Rate, 1973 to 1992*
Percent of All Proposals to Change

| Reserve Bank | 1973–92 (1) | 1973–82 (2) | 1983–92 (3) | Percentage Point Difference (4) = (3) − (2) |
|---|---|---|---|---|
| St. Louis | 90 | 88 | 92 | 4 |
| Cleveland | 78 | 76 | 80 | 4 |
| Richmond | 75 | 74 | 76 | 2 |
| New York | 61 | 78 | 44 | −34 |
| Atlanta | 56 | 59 | 52 | −7 |
| Minneapolis | 48 | 56 | 36 | −20 |
| Philadelphia | 46 | 41 | 52 | 11 |
| Kansas City | 43 | 55 | 14 | −41 |
| San Francisco | 38 | 44 | 32 | −12 |
| Chicago | 33 | 46 | 17 | −29 |
| Boston | 26 | 39 | 15 | −24 |
| Dallas | 18 | 48 | 9 | −39 |
| All Reserve Banks | 51 | 59 | 43 | −16 |

Note: Ordering based on column (1).
Source: See Table 1.

## *II. The Chronology of Discount Rate Changes*

As illustrated in Figure 1, the history of discount rate changes over the past 20 years can be condensed into four, or perhaps even three, major cycles—four upswings and four downswings. Each phase, defined more precisely in Table 7, will be described chronologically.

### *The January 1973 to April 1974 Upswing*

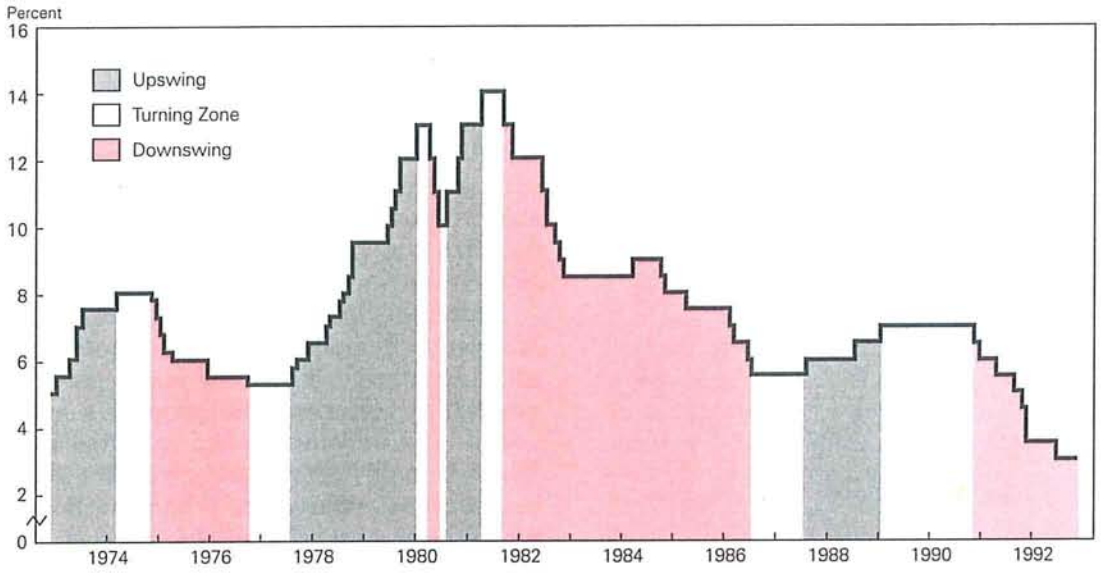
The discount rate was increased from 4½ to 5 percent on January 12, 1973, the first change since December 1971 as the rate had essentially been frozen during Phase II of wage and price controls. Fed Chairman Arthur Burns, who had advocated controls prior to their adoption in August 1971, served as Chairman of the Committee on Interest Rates and Dividends. In late 1972 the Chicago Reserve Bank had been the first to propose an increase (25 basis points), which was denied on January 2, 1973. A San Francisco proposal to increase was merely tabled one week later, and proposals from seven Banks were tabled only one day before the increase was approved.

Once the Phase III thaw of frozen wages and prices was instituted, prices started to rise and the discount rate was raised seven times in seven months (January 12 to August 13, 1973). This upswing took the rate to 7½ percent, well above its previous high of 6 percent, which had prevailed from April 1969 to November 1970. The initiative for raising the rate shifted among the Reserve Banks: Chicago was the first to propose the initial increase, and Kansas City the first to propose both the record-breaking increase to 6½ percent and the subsequent increase to 7

Figure 1

*The Discount Rate*

January 1973 to December 1992




percent. The breadth of the sentiment to increase rates is illustrated by the fact that all 12 Reserve Banks had proposed the increase that occurred in April 1973, the first of only two unanimous recommendations in the past 20 years, the period of study here. Nine banks had been calling for that increase since March 23, suggesting that this was an instance when the Reserve Banks led the Board of Governors in pushing up the rate. In September 1973, five Banks sought further increases, but their proposals were denied by the Board of Governors.

The OPEC oil embargo and the quadrupling of the price of imported oil complicated the policy picture and ended the unanimous sentiment for rate increases. Interpreting the oil price shock as a one-time increase in the price level rather than an increase in the inflation rate, and fearing a recession, Boston voted continuously from October 1973 through March 1974 for a rate reduction; each request was denied by the Board. The first requests for still another rate increase, by Cleveland and Chicago, were initially tabled, then denied, but resubmitted and ultimately approved in April 1974. St. Louis and Kansas City immediately sought further increases, eventually raising their requests to 100 basis points—what at that time would have been the largest discount rate change since 1933, when two banks changed their rates by 100 basis points—but eventually discontinued their requests after a series of denials.

### *The December 1974 to November 1976 Downswing*

By September 1974, the time of the Whip Inflation Now (or WIN) Conference, the sentiment for rate increases had faded. Atlanta was the first Bank to propose a rate cut, on September 9, 1974, but did not resubmit its proposal after two denials by the Board of Governors. Philadelphia proposed a cut in October that was denied, then it resubmitted its proposal in November. Although this proposal was also denied on November 25, when the proposal was resubmitted and joined by New York it was accepted on December 6, 1974, more than a year after the start of the recession.

Once the severity of the recession became clear, the discount rate was cut four times in four months and seven times over the next year. After each of the first five reductions, at least one Reserve Bank immediately submitted a proposal for a further cut—Boston after the first two, Minneapolis next, then

Table 7
*Discount Rate Cycles*

| Cycle | Upswing | Downswing | Number of Rate Changes | Cumulative Absolute Change (Basis Points) |
|---|---|---|---|---|
| U1 | 1-12-73 to 4-24-74 | | 8 | 350 |
| D1 | | 12-6-74 to 11-19-76 | 7 | 275 |
| U2 | 8-29-77 to 2-15-80 | | 14 | 775 |
| D2 | | 5-28-80 to 7-25-80 | 3 | 300 |
| U3 | 9-25-80 to 5-4-81 | | 4 | 400 |
| D3[a] | | 10-30-81 to 8-20-86 | 15 | 850 |
| U4 | 9-4-87 to 2-24-89 | | 3 | 150 |
| D4 | | 12-18-90 to 7-2-92 | 7 | 400 |

[a]This classification ignores the April 6, 1984 increase which was reversed November 21, 1984. See pp. 15–16 of the text for the underlying reasoning.
Source: See Table 1.

Kansas City, Boston, and Philadelphia together, San Francisco, and finally Kansas City. Over this period only one proposal to increase the rate was received, submitted by Kansas City on January 10, 1975. This proposal was tabled, whereas a Boston proposal to cut had been denied on January 8 and Philadelphia and San Francisco proposals to cut were to be denied on January 20. The fact that 10 Reserve Banks had submitted reduction proposals by the time a cut was approved on March 7, 1975, and 11 Banks before the May 15, 1975 and January 16, 1976 reductions, suggests that the Reserve Banks again played a primary role in encouraging these discount rate reductions.

After the November 19, 1976 decrease, six Reserve Banks soon sought an additional reduction, but when these requests were denied, they were all withdrawn by January of 1977.

### *The August 1977 to February 1980 Upswing*

The first proposal for an increase came from St. Louis on May 13, 1977, but this request was denied and not resubmitted. A similar proposal by Chicago met the same fate. Atlanta was more persistent, submitting a string of five proposals to increase the rate between May and July of 1977, each of which was denied. After a single interruption, Atlanta resubmitted its increase proposal in early August, and it was again denied. By August 19, however, nine Reserve Banks had submitted increase proposals, and they were approved by the end of the month, the first increase in the discount rate since April 24, 1974.

A month later, Boston proposed a further increase (which was denied) but by October 1977 all 12 Reserve Banks were again asking for increases of at least 25 basis points—eight Banks favored 50 basis points. The Board of Governors approved a 25-basis-point increase on October 25, 1977. Chicago immediately proposed an additional 25 basis points, but after its request was denied, did not resubmit until early 1978.

After the Board had been slow to respond to rate hike requests in 1977—issuing frequent denials and granting approvals only after an unusually large number of Reserve Bank proposals had been received—the initiative shifted from the Banks to the Board in early 1978. Chicago voted a 25-basis-point increase on January 5th. When the Board met the next day, several members argued that "to be effective [in supplementing the recently announced policy of more active intervention in foreign exchange markets], an increase should be at least ½ percentage point and should be accompanied by action by the Federal Open Market Committee to increase the range of the Federal funds rate." Because no proposal to increase by at least 50 basis points had been received and because some Board members questioned the advisability of the increase, it was agreed to postpone action until late in the day. According to the minutes "the tenor" of the "discussion would be conveyed to the Federal Reserve Bank of Chicago, in the event that the Bank's board of directors might wish to propose a ½ percentage point, and to the New York Reserve Bank, whose directors also were thought to be inclined toward such an action."

By the time the Board meeting reconvened later that day, New York had indeed voted a 50-basis-point increase and Chicago had modified its original request to include an increase of either 25 *or* 50 basis points. The two proposals were approved.

This episode illustrates several points. The clearest is that the initiative for change, which rests nominally with the Banks, can be exercised by the Board by conveying its wishes to the Banks and, in effect, eliciting a proposal to change the rate. Second, even though Chicago had first proposed an increase—the proposal that had been discontinued after denial in October 1977—and had been the only

Reserve Bank proposing an increase at the start of the January 6, 1978 meeting, the New York Bank was the first to propose an increase of the magnitude that the majority of the Board preferred. Thus, although Chicago was first to propose the direction of change, New York (and Chicago) were first to propose the direction and correct magnitude of the change. Finally, this instance may help to explain why New York most frequently had submitted a proposal at the time of Board approval.

As a result of its responsibilities for the operations at both the domestic and the foreign trading desks, the New York Bank is in more or less continuous contact with both of these markets and with the thinking of the Federal Open Market Committee. It is not surprising to find the New York Bank to be a highly reliable gauge of the exact timing of discount rate changes even though, as we have seen, it is neither the most active Bank nor commonly the first to suggest a change.

In early March of 1978 G. William Miller became Chairman of the Federal Reserve System. Between May and November of 1978 the discount rate was increased six times in less than eight months. The initial proposals for these increases came from several Reserve Banks, including St. Louis, Atlanta, Minneapolis, and Boston. In September 1978, the discount rate was raised to 8 percent, its all-time high first reached in April 1974. A Boston proposal to increase further to 8¼ percent was denied on October 6, but requests by Boston, along with nine other Banks, to increase were approved only one week later. Once again, a denial was quickly followed by an approval, this time an increase of 50 basis points.

*The history of discount rate changes over the past 20 years can be condensed into four, or perhaps even three, major cycles.*

Two weeks after this increase, Boston submitted a request to increase by still another 50 basis points but its request was denied October 27, 1978. Four days later, a New York proposal to increase by 100 basis points was tabled but then approved the next day, the first time the discount rate had been increased 100 basis points at one time since 1933. This sequence of events could suggest that the Board had strong views on the exact magnitude and/or timing of the rate change or simply that the Board changed its views rapidly.

After the quick succession of rate increases that culminated with the 100-basis-point increase on November 1, 1978, sentiment shifted again. From December 15, 1978 to May 25, 1979, the period immediately after the revolution in Iran which precipitated another sharp increase in the price of oil, 10 different Reserve Banks (all except Minneapolis and Kansas City) submitted proposals for further increases, all of which were denied and not resubmitted. With concern about an imminent recession widespread, the sentiment for further tightening was not strong. On May 25, 1979 four banks proposed a 25-basis-point increase, but none resubmitted its request once it was denied. Then, when New York voted a 50-basis-point increase, the proposal was approved the same day by the Board. This is the only case in this 20-year period where the Board has approved the request of a single Bank the same day that it was made. It is perhaps the clearest example of how the Board can await, invite, or perhaps even solicit a change from the Reserve Banks.

Shortly after the New York proposal to increase the discount rate to 10 percent had been approved, Paul Volcker, President of the Federal Reserve Bank of New York, became Chairman of the Board of Governors of the Federal Reserve System. One week after Volcker took office, the Board denied a San Francisco proposal to increase the discount rate another 25 basis points. Only three days later, however, proposals by New York, Philadelphia, Richmond, and Kansas City for a 50-basis-point increase were approved on August 16, 1979. Cleveland immediately proposed another 50-basis-point increase which, after the request had been joined by those of eight other Banks, was approved on September 18, 1979.

Boston's proposal to raise the rate by a further 50 basis points was tabled on October 4th, but New York's proposed 100-basis-point increase was approved on October 6, 1979, as part of the special Saturday meeting that changed the Federal Reserve System's short-term operating procedures. Five Banks soon proposed further increases, including 100-basis-point requests from Atlanta, Chicago, and Kansas City. After these requests were tabled by the Board, those from Minneapolis, Kansas City, and Dallas were not resubmitted. Atlanta and Chicago, which had scaled down their requests to 50 basis points and had been joined by Cleveland, did not

renew their requests after Board denial on November 26, 1979.

No further requests for change were received until February 1980, when New York proposed a 50-basis-point increase. The request was subsequently raised to 100 basis points and, after New York was joined by four other Reserve Banks, was approved on February 15, 1980. All Banks except Boston sought further increases of at least 100 basis points; seven were proposing 200-basis-point increases. These proposals were all tabled and were not resubmitted after a special surcharge on large banks' borrowing was approved on March 14, 1980 as part of the credit control program imposed by President Carter. Two weeks later, St. Louis proposed a 200-basis-point increase and Cleveland a 300-basis-point increase, both of which were denied.

### *The May 1980 to July 1980 Downswing*

With the severity of the 1980 recession increasingly clear and market interest rates plummeting, starting in May 1980 three Reserve Banks, Chicago, Minneapolis, and Kansas City, proposed reductions, which were approved May 28, 1980. Five Banks followed immediately with another 100-basis-point reduction proposal, which was approved June 12, 1980, a few weeks before the credit control program was terminated. The same five Banks (Chicago, St. Louis, Minneapolis, Dallas, and San Francisco) proposed yet another round of 100-basis-point cuts, which were approved July 25, 1980, after Dallas had withdrawn its request, San Francisco had raised its proposed cut to 200 basis points, and Richmond and Kansas City had joined in.

It could be argued that this quick succession of cuts was only an aberration and that the upswing that started in August 1977 lasted until May 1981. Though appealing in hindsight, the view is probably an inappropriate interpretation of the feeling at that time. Like the 1980 recession itself, the downturn in rates, although extremely brief, was also extremely sharp. At least from a financial markets perspective, the 300-basis-point decline in the discount rate that accompanied a decline of more than 900 basis points in short-term market rates is simply too large to be called a mere aberration.

### *The September 1980 to May 1981 Upswing*

No further proposals for change were received until St. Louis, which along with Chicago and Minneapolis had been a leading advocate of rate cuts, proposed a 50-basis-point increase, which was denied September 15, 1980. Boston's proposal for a 100-basis-point increase and Atlanta's proposal for a 50-basis-point increase were tabled on September 22, but a 100-basis-point increase by several other Reserve Banks was approved three days later. Four Banks soon proposed still another increase, but their requests were tabled on October 27. Eleven Banks had requested increases ranging from 100 to 200 basis points by the time the 100-basis-point increase was approved on November 14. And by December 1, six Banks were seeking an increase of at least another full percentage point, a proposal that was approved on December 4, 1980. Thus, in less than a year the discount rate quickly fell 300 basis points and then returned to its all-time high for that time of 13 percent.

*The history of discount rate proposals shows both a common core and also considerable diversity in the ways the Reserve Banks approach discount rate determination.*

Three banks immediately wanted to go further—Richmond and St. Louis proposed adding another 100 basis points and Cleveland 200 basis points. Their requests were initially tabled, then denied in late 1980 and not resubmitted. No further changes were proposed from mid-January until Boston proposed a 100-basis-point increase in late April, approved May 4, 1981.

San Francisco and Atlanta each presented one additional increase proposal but did not resubmit them after they were denied.

### *The October 1981 to August 1986 Downswing*

After May 1981, no proposals were made until, on October 23, 1981, Chicago voted a 100-basis-point reduction. This proposal was tabled on October 26, as was Minneapolis's 50-basis-point cut proposed on October 29. The very next day, however, the 100-basis-point cut was approved. That was the first in

what was to be an extended series of cuts associated with the 1981–82 recession.

Soon after the October cut, Richmond and San Francisco proposed another; their proposal was denied on November 16. By the end of the month, however, three other Banks joined them in proposing a cut and this time the proposals were tabled by the Board of Governors. It was on December 3, 1981, that 10 Banks' reduction proposals were approved. But this was not to become another sequence of quick cuts. The San Francisco Bank immediately proposed a further cut but did not resubmit its proposal after it had been tabled twice. The speed with which sentiment was shifting is illustrated by the fact that by late January 1982, San Francisco and St. Louis were proposing a 100-basis-point *increase*. After their proposals were tabled, they were joined by Richmond and Atlanta. The Banks did not resubmit their requests after they had been tabled on February 22, however, except for St. Louis, which persisted with an interruption until May in asking for an increase. Back in March, Dallas had begun requesting a 100-basis-point reduction and was soon joined by Chicago, which sought a 50-basis-point reduction.

The sharp division of opinion that prevailed in the System is illustrated by the Board of Governors' April 12, 1982 decision to deny Dallas's proposal for a 100-basis-point reduction, Chicago's proposal for a 50-basis-point reduction, and the St. Louis request for a 100-basis-point increase. Dallas dropped out after the denial and St. Louis after its proposal was tabled on May 10, 1982. Reflecting the great uncertainty at the time, requests both to increase and to decrease the discount rate were again tabled on June 30 and July 6, 1982. Despite two Board denials, Chicago persisted in its rate cut proposal for nearly four months, until it was approved on July 19, 1982, the first cut in more than seven months.

The July 19, 1982 decision was a watershed for monetary policy. Four cuts were made in less than two months, and seven cuts in all were made before the end of the year. Chicago clearly led the way by proposing a 50-basis-point cut continually from March through November. After moving in steps of 100 basis points from October 6, 1979 through December 3, 1981, the Board of Governors made all of its cuts in 50-basis-point steps. Similarly, except for one request each of 100 basis points from San Francisco and Dallas, all the proposals for reduction in this period were for 50 basis points. Despite the rapid money growth associated with the nationwide introduction of interest-bearing NOW accounts and, subsequently, of money market deposit accounts, no proposals to increase rates were made after those by Cleveland in late June and early July of 1982. These observations are consistent with the view that the new operating regime introduced on October 6, 1979, which placed greater emphasis on monetary growth, came to an end in the summer or early fall of 1982.

The year 1983 proved to be the first (and only) year since 1972—when wage and price controls were in effect—that the discount rate was not changed. This stability does not imply this period was one without controversy. In early 1983, eight Reserve Banks sought further rate reductions. In March, Richmond sought an increase. In early June, no Bank sought a change, but by early July five wanted a rate increase. And by fall, two Banks were again proposing a reduction. Over the entire year, six Banks had proposed reductions, four had proposed increases, and two had proposed both reductions and increases.

Sentiment from the Board of Governors clearly evolved toward restraint during the year: in January as many as seven requests for reductions were tabled. By spring such requests were denied. Throughout the summer, as many as five requests for increases were tabled but not denied.

In early 1984, after Chicago desisted from nearly four months of recommending reductions, no proposals for change were made. In March, St. Louis and Dallas proposed increases that were tabled, resubmitted, and approved April 6, 1984.

Starting in late May, Cleveland proposed further increases and was soon joined by four other Banks. Most of these proposals were withdrawn after tabling, but St. Louis persisted until its requests had been denied several times. This was to be the last request for an increase until April 1987. In November 1984, two of the Banks that earlier had sought increases (St. Louis and Dallas) were joined by Chicago and San Francisco in proposing a 50-basis-point re-

*No critical, magic number of proposals triggers the Board to act on the discount rate—the number has varied from one Bank to all 12 Banks.*

duction. That proposal, along with those of three other banks, was approved on November 21, 1984. Not only was the April increase reversed but this cut was followed by another 50-basis-point cut one month later, leaving the rate at the end of 1984 below its level at the start of the year.

The April 6, 1984 increase was the first occasion since July 1971, and the only example in the past 20 years, when the discount rate was changed only once in a particular direction: not only had the April 1984 increase been preceded by a series of nine consecutive cuts, but it was to be followed by a series of seven consecutive cuts. From a broad historical perspective, this single April 1984 increase has been treated here as a temporary aberration within an extended period of declining rates.

Thus, the chronology of four major cycles proposed here ignores the April 1984 increase. An odd "mini cycle" occurred in 1984, within what is here classified as a protracted downswing. This brief reversal within a long sequence of reductions may be related to two factors: (1) the Federal Reserve was operating on a borrowed reserves target regime; and (2) the federal funds market had been subjected to unusual pressure by the failure of a major commercial bank (Continental Illinois). The combination of these two factors had resulted in a sharp increase in the federal funds rate. The minutes of the March 23, 1984 Board of Governors meeting state:

> In the course of the Board's discussion [prior to the approval of the April increase], considerable emphasis was given to the desirability of raising the discount rate in order to bring it into better alignment with market rates. The latter had increased appreciably over the course of recent weeks, and borrowing at the discount window had risen substantially. . . .

Starting in November of 1984 Dallas, which had requested a 100-basis-point increase in July, began issuing a more or less continual series of requests for rate reduction. Thus Dallas was the clear leader, along with San Francisco to a lesser extent, in the series of seven rate reductions that took place between November 1984 and August 1986. Despite the fact that no rate increases were proposed after September 1984, this phase of the downswing was not an entirely smooth one. In early 1986, as many as eight Banks were proposing cuts. All except Dallas and San Francisco eventually withdrew their proposals after repeated tabling by the Board.

On the morning of February 24, 1986, the Board voted (four to three) to approve a reduction. Chairman Volcker voted with the minority, which expressed concern about the impact of the reduction on the foreign exchange value of the dollar. This decision to reduce the discount rate was not implemented, as the Board reconsidered its action later the same day. On March 6, however, 10 days after the controversial vote, a decrease to 7 percent was approved without dissent. The discount rate was reduced three more times in 1986 (April 18, July 10, and August 20). These reductions were led by Dallas and three other Banks.

### *The September 1987 to February 1989 Upswing*

Starting in April 1987, five Banks began requesting increases. In each case their requests were not resubmitted after tabling, not denial, by the Board of Governors.

On August 11, 1987 Alan Greenspan replaced Paul Volcker as chairman of the Federal Reserve Board. At the time, no Reserve Bank was seeking a change in the discount rate. (Dallas's two recent reduction requests had been denied.) Within a week, however, Cleveland proposed a 50-basis-point increase; the proposal was denied, resubmitted, and denied again on August 31. When the Board met again on September 3, "developments in financial markets in recent days [had] suggested that an increase in the discount rate might be appropriate.

*The propensity to propose discount rate changes has varied both among Reserve Banks and over time.*

Although tentatively favoring a ½ percentage point increase, the [Board] members preferred to defer action on the matter overnight so that they could assess evolving conditions in the bond and foreign markets further." That same day, New York had voted an increase and Cleveland had renewed its proposal to increase; their proposals were approved on September 4, 1987.

This sequence of events illustrates how rapidly conditions can change and how difficult it can be to assign the initiative for change. Cleveland had been seeking an increase for several weeks but its requests were twice denied. Nonetheless, with rapidly chang-

ing circumstances, its proposal, along with New York's, was approved four days after a denial. Having no control over timing, a Reserve Bank needs to recognize that tabling or even denial of a proposal does not preclude its approval in the near future if circumstances change.

The October 1987 stock market crash may have encouraged Dallas to request additional reductions, but no other Bank joined in until San Francisco briefly sought a 25-basis-point reduction, in February 1988. Philadelphia, in April 1988, was the first to propose another increase and by July had been joined by seven other Banks. These requests had been tabled by the Board until July 5, when the requests for a 50-basis-point increase by seven Banks (San Francisco had withdrawn) were denied. Only Cleveland and Atlanta persisted in proposing increases until, after being joined by seven other Banks, their request was eventually approved on August 9. Cleveland soon requested another increase and persisted despite several denials; eventually it even raised its request to 100 basis points. By early 1989, Cleveland had been joined by six other Banks and eleven Banks (all but Dallas) were in at the time an increase was finally approved, on February 24, 1989.

### *The December 1990 to July 1992 Downswing*

In May 1989, Dallas started another series of requests for a rate reduction. These proposals were tabled, and they were joined briefly by one from Chicago in the fall. In early 1990, Cleveland proposed a 50-basis-point increase. By May 1990, San Francisco had joined Cleveland with a 25-basis-point increase proposal, and Dallas had temporarily dropped its reduction requests. Throughout most of the first half of 1990, the Board had been tabling one request for a rate increase and one request for a rate decrease.

In July 1990, after two consecutive denials, Cleveland dropped its increase proposals. Starting in August 1990, the first month of the 1990–91 recession, Dallas continuously requested a 50-basis-point reduction until, after being joined by eight other Banks, the request was approved on December 18, 1990. This is the longest lead time between an original, uninterrupted request and its eventual approval in the entire 20-year period. Dallas, Richmond, and Boston proposed another cut in early 1991, which was approved February 1. Dallas and Boston soon proposed still another cut, which was approved on April 30 along with those of three other Banks. No further requests for change were received until Boston, Cleveland, and Philadelphia sought another cut in August 1991, which was approved September 13. Boston and Cleveland soon sought still another cut and it was approved November 6, 1991. Chicago quickly proposed another reduction and had been joined by four other Banks by December 16, 1991, when their proposals were tabled. Three days later Chicago, along with New York, increased the size of the proposed reduction to 100 basis points and received approval from the Board of Governors.

In February 1992, Boston proposed another reduction in the rate. After the Board tabled the request for four months, Boston did not resubmit its request in June. On June 25, 1992 Chicago voted a 50-basis-point cut, which was tabled June 29, 1992. The Board approved Chicago's request, the only request on the table, on July 2, 1992. The action established a 3 percent discount rate, which has prevailed up until the time of this writing (April 1993).

## *III. Determinants of Reserve Bank Proposals*

A review of the history of discount rate activity and summary statistics over the past 20 years shows a broad similarity but also considerable diversity in the ways the 12 Reserve Banks approach discount rate determination. This section attempts to formalize this observation with a statistical model of discount rate recommendations that incorporates both common and distinctive factors influencing Reserve Banks' discount rate proposals. Under the presumption that the decision to propose a change in the rate, rather than the exact magnitude of the proposed change, is of paramount importance, a logit model is used to estimate how various factors influence the probability of proposing an increase or a decrease in the discount rate.

Logit estimation techniques are used when the dependent variable, in this case the recommended change in the discount rate, is discontinuous. Because recommended changes take on only a few values with any regularity (typically changes of 25 or 50 basis points) the error term, given the values of the independent variables, can take on only a few values. Under these circumstances estimates from an OLS regression would be inefficient. The logit estimation technique transforms the problem to produce efficient estimators. Logit provides an estimate of the probability, relative to no change, that a Reserve Bank will recommend an increase or decrease in the

discount rate. The coefficient of a variable is an estimate of the effect of that independent variable on those probabilities.[6] There are two sets of coefficients for each variable because there are two different policies other than a no change recommendation.

The descriptive statistics and historical account presented above show that all Reserve Banks do not behave identically. At the same time, preliminary attempts to model each Bank separately were unsatisfactory, most probably because of the limited number of change proposals for some Banks. The equations presented in this paper attempt to specify a joint regression for all Banks' recommendations while allowing for individual Bank differences. Specifically, the base regression used assumed that every Bank cared equally about all the independent variables, and that all Banks shared the same coefficients for these variables. This constraint was then relaxed for every variable and every Bank in order to test whether the independent variables actually did identically affect the Banks' discount rate recommendations. When a Bank's coefficient was found to differ significantly from the others', the equation was altered to allow those coefficients to differ.[7] The final results of this search procedure are presented in Table 8.

Thus, the equation described in Table 8 emerged from a fairly extensive "specification search" across 12 Reserve Banks and even more independent variables. Other searchers might well arrive at a somewhat different final equation. In addition, things have changed over time—Boston's distinctive behavior stems solely from the 1973–74 oil shock, as Dallas's does from the collapse in oil prices in 1986—and may well change again. Nevertheless, all of the explanatory equations looked similar to the one reported here. Moreover, the equation in Table 8 was also estimated using the ordered probit technique which ranks policy from tighten, to no change, to loosen. With one exception, the logit results also hold when the ordered probit estimation technique is used.[8]

The results are shown in Table 8. At the most general level, Reserve Banks pay attention to three types of information—labor markets, financial markets, and inflation or monetary aggregates. For all Banks, employment growth was a significant determinant of discount rate proposals. The unemployment rate was also a factor in decisions to propose an increase in the discount rate, though apparently not in those to propose a decrease. In addition, three Banks placed independent weight on labor market conditions in their Districts: Chicago and Atlanta were influenced by regional employment growth, and Chicago and Dallas were influenced by the unemployment rate in their District.

These regional effects may reflect different views of the role of the Reserve Bank in the procedure for setting the discount rate. The typical view is that Banks' proposals are based on their own assessment of national economic conditions, because one rate applies throughout the country. It is also possible to interpret the two-stage process of setting the discount rate another way, however. The Reserve Banks may be viewed as basing their recommendations on what is most appropriate for their District; the role of the Board of Governors, in this view, would be to weigh the grass roots input from the regions in order to form a national policy. Whichever interpretation is correct, it does seem clear that some Reserve Banks do attach independent importance to labor market conditions in their District.

Second, it is clear that all Banks attach importance to developments in the financial markets. Over time, the emphasis appears to have shifted between interest rates and monetary aggregates. Specifically, all Banks placed considerable weight on the growth of the narrow monetary aggregate in the period following the October 1979 change in operating procedures. In the periods both before October 1979 and since 1982, emphasis was also placed on the spread between the federal funds rate and the discount rate. This emphasis accords with the importance attached, in discount rate announcements, to keeping the discount rate "aligned" with other short-term interest rates. The spread seems to have been a more important factor in proposals to increase than for those to decrease, especially in the most recent period.

The most subtle consideration in discount rate proposals is the role of inflation or monetary growth (as a proxy for future inflation). As was true in the

[6] The effect of the independent variable on the probability of changing policy depends on the value of the independent variable; thus, the size of the effect changes as the value of the independent variable changes. As a result, the magnitude of the effect of each variable on the probabilities is traditionally calculated at the mean of the right-hand side variables.

[7] For each variable, each Reserve Bank was sequentially removed from the group to test whether that Bank's coefficient for that variable differed from the rest of the group. If it did, then the variables were changed so that the coefficients could differ. Subsequent Banks were tested to see if they belonged in either group or alone. Because the sequence can matter, alternative sequences were tested, and they generally had no effect on the groupings.

[8] The exception is national payroll employment, which took on the opposite sign. This puzzling result may reflect the collinearity of using several different labor market variables.

Table 8
*Determinants of Discount Rate Proposals (RDP), 1973–1992*

| Variable | Increases | Decreases |
|---|---|---|
| N | .33 | −.25 |
| | (.05) | (.04) |
| NR67 | .07 | −.13 |
| | (.04) | (.05) |
| UR | −.60 | −.001 |
| | (.10) | (.08) |
| URR711 | −.02 | .11 |
| | (.04) | (.02) |
| CPIL58 | .08 | −.14 |
| | (.04) | (.04) |
| M1R2 | .28 | −.38 |
| | (.03) | (.06) |
| MOR13 | .27 | .02 |
| | (.05) | (.04) |
| M5 | .26 | −.38 |
| | (.08) | (.11) |
| M8 | .37 | −.47 |
| | (.08) | (.14) |
| SPDR1 | .36 | −.35 |
| | (.10) | (.19) |
| SPDR3 | .72 | −.18 |
| | (.12) | (.17) |
| RDP(−1) | .02 | −.04 |
| | (.003) | (.004) |
| OIL1 | −.58 | 2.69 |
| | (1.05) | (.59) |
| Constant | −2.95 | −1.72 |
| | (.66) | (.64) |

Note: Standard errors in parentheses.
RDP: dependent variable; the direction of the change in the discount rate proposed by each District, 0 for no change, 1 for tightening (increase), 2 for loosening (decrease).
N: rate of growth in national payroll employment: 3-month percent change at annual rate.
NR67: corresponding regional employment growth rate for Atlanta(6) and Chicago(7) Districts.
UR: national unemployment rate.
URR711: regional unemployment rate for Chicago(7) and Dallas(11) Districts.
CPIL58: CPI for all Districts except Richmond(5) and St. Louis(8), 12-month growth rate.
M1R2: rate of growth in M1: 3-month percent change at annual rate for the period from 1979:10 to 1982:09, zero otherwise.
MOR13: splice of the 12-month percent change in M1 from 1973:01 to 1979:09, zeros from 1979:10 to 1982:09, and the 12-month percent change in M2 from 1982:10 to 1992:12, for all Districts except Richmond(5) and St. Louis(8).
M5: splice of the 3-year growth rate in M1 from 1973:01 to 1982:09 and the 3-year growth rate in M2 from 1982:10 to 1992:12, only for Richmond(5) District.
M8: same definition as M5, but for St. Louis District(8).
SPDR1: spread between the federal funds rate and the discount rate for the period 1973:01 to 1979:09, zero otherwise.
SPDR3: same spread for the period 1982:10 to 1992:12, zero otherwise.
RDP(−1): the one-month lag in the dependent variable.
OIL1: 1 for Boston from 1973:10 to 1975:03 and 1979:05 to 1980:07, zero otherwise.

case of regional labor market conditions, it seems clear that not all Reserve Banks react to inflation/money growth in the same way. For most Banks, the actual inflation rate was an important factor in determining proposals. For the St. Louis and Richmond Banks, however, a four-year lag of the narrow money stock dominated the actual inflation rate as a determinant of discount rate proposals. This result is consistent with the inflation equation in the St. Louis model, in which inflation depends on a long distributed lag of growth in the narrow money stock. The Richmond Bank also followed a monetarist approach, although the hypothesis that St. Louis and Richmond reacted identically was rejected in a formal statistical test.

Still another distinctive individual Bank feature is Boston's tendency to accommodate the oil price shocks of 1973–74 and 1979. Preliminary experimentation with individual bank dummy variables had revealed an unexplained tendency for Boston to favor rate reduction. Experimentation showed that this tendency was due solely to the 1973–74 oil price episode, described in detail above in connection with Table 5. Addition of an oil price accommodation variable for the 1973–74 and 1979 episodes eliminates Boston's otherwise unexplained proclivity to ease.

Finally, a word of caution on the robustness of these results. This data set is large and complex, and several specification searches were conducted to obtain these results. Thus, strictly speaking, formal statistical tests do not apply. Certainly, the distinctive characteristics of particular Reserve Banks should be taken with a grain of salt. The broad results for the Banks as a group, however, seem to be on a solid footing qualitatively, even if not precise quantitatively.

## *IV. Determinants of Discount Rate Changes*

Setting the discount rate is a two-step process. Most of the discussion to this point has focused on the first step, the discount rate proposals made by the Boards of Directors of the 12 Reserve Banks. Once these proposals from the regional Banks are reviewed, the Board of Governors disposes of them by accepting, denying, or choosing to take no action on them. The information the Board uses to make its determination is presumably essentially the same as that on which the Banks base their proposals. The one additional piece of relevant information the Board has is the Reserve Banks' discount rate propos-

Table 9
*Number of Proposals Submitted at Time of Discount Rate Change: Frequency Distribution*

| Number of Proposals | 1973–82 (1) | 1983–92 (2) | 1973–92 (3) |
|---|---|---|---|
| 1 | 2 | 1 | 3 |
| 2 | 5 | 2 | 7 |
| 3 | 0 | 0 | 0 |
| 4 | 4 | 0 | 4 |
| 5 | 4 | 4 | 8 |
| 6 | 7 | 0 | 7 |
| 7 | 2 | 6 | 8 |
| 8 | 6 | 1 | 7 |
| 9 | 4 | 3 | 7 |
| 10 | 7 | 0 | 7 |
| 11 | 2 | 1 | 3 |
| 12 | 2 | 0 | 2 |
| Number of Discount Rate Changes | 45 | 18 | 63 |
| Mean Number of Proposals | 6.8 | 6.3 | 6.6 |

Source: See Table 1.

Table 10
*Discount Rate Changes (RD), 1973–1992*

| Variable | Increases | Decreases |
|---|---|---|
| N | .45 | −.41 |
| | (.21) | (.14) |
| UR | −.90 | .04 |
| | (.36) | (.26) |
| CPI | .09 | −.14 |
| | (.14) | (.11) |
| M1R1 | .40 | −.42 |
| | (.13) | (.16) |
| M1R2 | .56 | −.37 |
| | (.16) | (.16) |
| M2R3 | .04 | −.13 |
| | (.22) | (.12) |
| SPDR3 | .94 | −2.61 |
| | (.55) | (1.04) |
| NOP | .20 | −.28 |
| | (.09) | (.16) |
| Constant | −1.19 | 1.31 |
| | (2.59) | (2.20) |

Note: Standard errors in parentheses.
RD: dependent variable; the direction of the one-month change in the discount rate, 0 for no change, 1 for tightening (increase), 2 for loosening (decrease).
N: rate of growth in national payroll employment: 3-month percent change at annual rate.
UR: national unemployment rate.
CPI: 12-month rate of growth in the CPI.
M1R1: rate of growth in M1: 3-month percent change at annual rate for the period from 1973:01 to 1979:09, zero otherwise.
M1R2: rate of growth in M1: 3-month percent change at annual rate for the period from 1979:10 to 1982:09, zero otherwise.
M2R3: 12-month percent change in M2 from 1982:10 to 1992:12, zero otherwise.
SPDR3: spread between the federal funds rate and the discount rate for the period 1982:10 to 1992:12, zero otherwise.
NOP: net number of proposals to increase the discount rate.

als. This section examines what economic information affects the Board's decision to change the discount rate and whether the Bank proposals have an independent impact on the Board's decision.

Table 9 shows the number of Reserve Banks that had submitted proposals to change the discount rate at the time the Board approved a change. (These figures are inclusive, in that they include Banks whose previous change proposal had been denied but whose Directors had not yet met again to offer another proposal.) The table makes clear that no critical, magic number of proposals triggers the Board to act—the number has varied from one Bank (on three occasions) to all 12 Banks (on two occasions). The vast majority of changes (76 percent) were made when four to 10 proposals had been received. The average number of proposals pending (6.6) has varied little over time or between increases and decreases in the discount rate.

When the Board waits until it has received 11 or 12 proposals—as it did for three increases (April 1973, October 1977, and February 1989) and for two decreases (May 1975 and January 1976)—it seems reasonable to regard the regional Banks as the initiators of the change. At the other extreme, when the Board acts on the first proposal received—as it did for the increases in July 1979 and May 1981 and the reduction of July 1992—it is reasonable to think that the Board had been disposed toward the change and was awaiting, or even inviting, a proposal on which to act. On some occasions, these actions may have encouraged Bank proposals, as was clearly the case in the January 1978 increase described in detail earlier.

Because the domestic and foreign trading desks at the New York Bank are in more or less continuous contact with the Board of Governors, it is not surprising that the New York Bank was included in seven of the 10 occasions when only one or two Banks had submitted a proposal at the time of a change. In fact, New York had a proposal pending at the time of a change more often (75 percent of the time) than any

other Bank. Only two other banks participated in more than one of these 10 changes, Boston in one solo and two two-Bank proposals (with New York) and Chicago in one solo and one two-Bank proposal for change. After New York, they were also the two Banks most often with a proposal at the time of change.

The question remains: Do the Reserve Banks' proposals have an independent effect on Board approvals, or does the Board simply respond to the standard economic data? The results are shown in Table 10, which has the same format as Table 8.

The only new variable is the (net) number of Bank proposals (NOP) before the Board. Notice first that employment growth has a significant effect on all changes, while the unemployment rate plays a role only in increases. Inflation influences the decision in the expected direction, but its effect is not significantly different from zero. In contrast, money growth, as measured by M1, had a clearly significant impact. Since 1983, the growth of M2 has not had a significant impact. In contrast, over this latest period, and only in this latest period, the interest rate spread has played a significant role, particularly as a deterrent to reductions.

Finally, these data support the view that Reserve Bank recommendations matter. The number of Banks proposing to change the discount rate has had a clear influence on the decisions to increase and a probable, though less precisely measured, impact on the decision to reduce the rate. In contrast to the results in section III, essentially these same results emerged from a variety of specifications of the equation, so only the most reasonable one is reported in Table 10.

## V. Summary and Conclusions

A voluminous literature has developed on open market operations, while scant attention has been paid to the process by which the discount rate is set. The discount rate is determined in a two-way interaction between proposals by the boards of directors of the Reserve Banks and disposition of their proposals by the Board of Governors.

A review of the evidence over the past 20 years clearly reveals that the Reserve Banks interpret their discount rate responsibilities differently. Banks differ in their activism: for example, over the last 10 years, Dallas has proposed to change the rate more than 40 percent of the time, whereas Kansas City and Minneapolis preferred a different rate less than 10 percent of the time. Banks differ also in how quickly they propose change. Chicago has most frequently been the first Reserve Bank to propose a change in the discount rate, whereas Richmond has seldom been the first. Banks also differ in their persistence in seeking change. Chicago and Dallas, relatively activist Reserve Banks, also frequently discontinued their proposals, whereas New York and especially Boston tend to stick with their proposals once they have been made.

Reserve Banks also appear to attach differing importance to the policy goals, and they seem to use different information sets or "models" in determining how best to reach those goals. For example, all Banks' behavior is influenced by inflation or monetary growth (perhaps as an indicator of future inflation), and by labor market conditions (perhaps as another indicator of future inflation). But individual characteristics also stand out. The St. Louis Bank apparently pays more attention to longer-term monetary growth trends than other Banks do. Dallas's behavior seems to have been influenced by the unemployment rate in that District, at least in the period since the 1986 oil price decline. Boston alone interpreted the 1973 explosion in oil prices as a contractionary shock, whose one-time price level effect should be accommodated.

*The data suggest that Reserve Bank recommendations have an independent influence on Board decisions regarding the discount rate.*

A particularly interesting set of proposals are those that proved in retrospect to be "out of sync" or in the opposite direction from the actual change that the Board of Governors eventually approved. Every Reserve Bank has made at least two such proposals, but several of these proposals can be justified, even in retrospect, as "correct" or at least defensible. The clearest example may be in early 1980 when 11 banks sought to raise the discount rate, seven proposing 15 percent. Although the basic rate was not raised, a surcharge on large banks was imposed so that these proposals were in a substantive sense adopted and thus not really out of sync. More controversial were proposals in 1973 and 1983 that were out of sync with

the next change but in the same direction as a long series of subsequent changes. It is easy to argue that these proposals were especially farsighted or, at a minimum, that their adoption would not have greatly altered the long-run course of economic history. Most common were proposals to extend a series of changes in one direction one step further than it actually was extended—in essence, a matter of timing. Most difficult to defend are those proposals to change that were both preceded and followed by changes in the opposite direction. Such proposals were put forward by five Banks in 1982, two Banks in 1988, and one Bank in 1975. In such cases, more is at issue than simply timing.

Both historical and statistical analyses reveal changes in discount rate behavior, timing, and diversity among Reserve Banks. All banks clearly were influenced by M1 growth in the two-year period following the October 6, 1979 change in the Federal Reserve's operating procedures. In contrast, Banks differ in the importance they have attached to money growth, both before and since. Similarly, the spread between the federal funds rate and the discount rate has recently taken on an importance that it did not have in earlier years, especially with regard to discount rate reductions.

The fundamental, though perhaps not surprising, result is that the number of Reserve Bank proposals before the Board of Governors does have an effect on their discount rate decision, above and beyond national economic conditions. This result suggests that discount rate determination is in practice a two-stage process in which the District-level input plays an independent role.

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