



BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM
WASHINGTON, D. C. 20551

STRICTLY CONFIDENTIAL (FR)
CLASS I - FOMC

TO: Federal Open Market Committee

DATE: March 25, 1988

FROM: Normand Bernard *N.B.*

The attached memorandum, "Issues in the Implementation of Open Market Operations" was prepared by Messrs. Kohn and Sternlight and relates to item 12 on the agenda for the meeting on Tuesday, March 29.

Attachment

BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM

STRICTLY CONFIDENTIAL (FR)
CLASS I - FOMC

Office Correspondence

Date March 25, 1988

To Federal Open Market Committee

Subject Issues in the Implementation of Open

From Donald Kohn and Peter Sternlight

Market Operations

At the last meeting of the Committee several issues were raised about the implementation of open market operations. These included the degree of emphasis on federal funds rate or borrowing objectives in day-to-day operations, the frequency of Committee meetings, and the discretion of the Manager and Chairman to make changes in policy between meetings without formal consultation with the Committee. A discussion of the approach to policy implementation has been scheduled for the March meeting. As background for that discussion, this memo briefly reviews the advantages and disadvantages of the current approach to each of these issues and some possible alternatives. (An attachment to this memo prepared by Ann-Marie Meulendyke of the Desk reviews the use of various indicators in policy implementation over the last 30 years.)

FEDERAL FUNDS RATES AND BORROWING

Recent experience. In the immediate aftermath of the stock market drop in October, the Desk concentrated much more than usual on the federal funds rate and other indicators of market conditions in the day-to-day implementation of policy, and much less on achieving an established objective for adjustment and seasonal borrowing. This was done to help stabilize markets and minimize the chances that the Federal Reserve's intentions would be misinterpreted while markets were in an extremely sensitive condition. As markets became less skittish, the Desk returned to more normal operating procedures, especially after year-end. However,

adjustments in borrowing assumptions were made, not only to effect changes in the stance of policy, but also to take account of shifts in the willingness of depository institutions to be seen at the discount window and of other special factors affecting the use of discount credit.

The data shown in the charts and tables suggest that deviations of both the federal funds rate and borrowing from expected levels increased immediately following the stock market collapse. Day-to-day funds rate variability declined substantially over the balance of 1987, though this is not fully reflected in the data shown in the chart, which are influenced by large deviations on the last day of statement periods. On several such days in the latter part of 1987, the funds rate dropped substantially owing to efforts earlier in the maintenance period to lean on the side of oversupplying reserves to forestall unwanted tautness in money markets. (The middle columns of Table 1 do not include Wednesday data.) Borrowing (Chart 2 and Table 2) dropped relative to expectations and to model results as market uncertainties apparently added to the reluctance of depository institutions to be seen at the window. Borrowing levels in the path were revised down to capture the shift in the borrowing function, but through the end of the year, such adjustments were inadequate to capture behavior fully.

Even as the focus of open market operations shifted back toward borrowing after year-end, the variability of the federal funds rate around expected levels did not increase. The Desk still is placing slightly more weight than pre-October 19 on this indicator in conducting daily open market operations. Borrowing has remained low, abstracting from some special

situations around year-end and a couple of instances of settlement day pressures. Evidence over the last few statement periods suggests that the reluctance to use the window is not as pronounced as late last year, and that the adjustments made to the borrowing assumption have roughly taken account of the remaining shift. Once these adjustments have been made, borrowing has shown no increase in variability around expected values as compared with the experience prior to the stock market crash.

Advantages and disadvantages.¹ The principal disadvantage of concentrating on achieving a borrowings objective is that the resulting federal funds rates may deviate from the level the Committee thought would be associated with the level of borrowing. As discussed in previous memos to the Committee, borrowing objectives may not be achieved for a variety of reasons, and if achieved may not be associated with the expected federal funds rate, reflecting among other factors market expectations about policy and changes in the willingness of depository institutions to use the discount window. On average over time, the Desk is able to meet borrowing targets; these targets, in turn, can be adjusted, if needed, to take account of lasting shifts in the borrowing function, so that federal funds rates should come out on average close to the Committee's expectations. And even in the short run, the Desk can compensate to a degree for a variety of temporary factors in implementing policy. But especially over short horizons, federal funds rates still will vary somewhat from expected levels.

1. This section is drawn from the memorandum of December 11, 1987 to the FOMC entitled "Strategies for Open Market Operations".

To the extent that these variations are relatively small and temporary, they probably would not have any significant effect on markets under most circumstances. But at times they can lead to a misperception of the Federal Reserve's intentions. Difficulties in achieving borrowing levels or the effects of market expectations on the borrowing/funds rate relationship can delay the impact on money market rates of policy actions to ease or tighten, or lead to market perceptions that a change in policy has occurred when none in fact was intended. In general, such misperceptions are corrected fairly quickly when the Desk follows its borrowing target. But if they do persist, or a shift in the underlying borrowing relationship is recognized only with a substantial lag, the funds rate can deviate for a time from Committee intentions. And it is money market rates, rather than the division of reserves between borrowed and non-borrowed components, that have the most direct impact on other financial variables in markets--such as long-term interest rates, exchange rates, and money growth--through which monetary policy is transmitted to the economy.

Specifying a narrow federal funds rate target as the short-run objective of open market operations clearly would avoid these difficulties. Such a target could be achievable with a fair degree of accuracy, especially if the Desk were to return to the procedures of the 1970's in which it occasionally engaged in open market operations several times each day. This would keep the funds rate generally between narrow intervention points that the market could readily discern. Questions about the current

stance of the Federal Reserve would not be eliminated, but they would probably be much less frequent.

The tendency for federal funds to trade very close to the Federal Reserve's expected range, however, is also the primary disadvantage of this procedure. Such an approach allows very little scope for market forces to show through in the federal funds market. These forces, while sometimes complicating the conduct of policy under a borrowing procedure, can also be beneficial to policy implementation, more broadly considered. Movements in the federal funds rate can convey information to policymakers about expectations and other aspects of financial market conditions. And these movements often will be in a stabilizing direction, as when a firming in the funds rate in response to strong economic or money supply data correctly anticipates a tightening action. A narrow focus on the funds rate tends to smother such market-generated reactions, leaving the policymakers looking at a mirror rather than at one potential indicator of underlying forces in the economy.

The combination of a relatively stable federal funds rate and the greater focus and identification of policy with this rate may also impart an undesirable degree of inertia to the policy process. Because small changes in the rate can come to be seen as signifying important shifts in Federal Reserve policy, they can become more difficult to make. Decisions to change the federal funds rate target may be especially difficult at the present time, when lack of confidence in the properties of the monetary aggregates has meant that any such adjustments normally are made only after consideration of a wide variety of indicators, which inevitably give

more or less conflicting signals. The danger would be that responses to emerging forces of inflation or deflation would be further delayed. Under a borrowing objective, market forces would have some, albeit limited, scope to lead money market rates in the appropriate direction.

INTERMEETING CONSULTATIONS

Since the late 1960's the directive has allowed for adjustments in policy without a Committee meeting during the period until the next scheduled meeting. The weights that should be placed on various types of information in making such adjustments and whether the Manager should be more inclined to ease or tighten in response to incoming data usually is extensively discussed at the meeting, and is capsulized in the directive. This flexibility allows policy to respond quickly should new data and developments in markets warrant, without a full Committee meeting. The understanding has been that any such moves would be made in consultation with the Chairman, would be relatively minor in size, and would be in accord with the contingencies discussed in the directive and at the meeting. In practice in recent years, this has meant moves of something like \$50 to \$100 million in the borrowing objective, which has typically been thought of as equivalent to a change of about 1/8 to 1/4 percentage point in the expected trading level of the federal funds rate. More substantial moves, or even in some conditions moves of the foregoing size, have been seen as calling at least for intermeeting consultation, and sometimes for a formal meeting of the Committee. Obviously, any intermeeting moves would be covered in detail in daily wires and periodic Desk

reports, as well as thoroughly reviewed at the next full meeting of the Committee.

If the Committee is of the view that this arrangement has been satisfactory, it could be left unchanged. The Manager would be understood to have some discretion to make relatively small intermeeting changes in the System's open market stance in consultation with the Chairman, who would decide whether such a policy shift were of sufficient interest or significance to warrant a telephone conference call to report to or consult with the Committee.

If the Committee felt that policy had not been well served by this degree of discretion, it could be narrowed. In the extreme, the sentence discussing intermeeting adjustments to policy could be deleted from the directive, in effect mandating a Committee meeting and vote for every change in policy, no matter how small. The danger is that small moves would become more difficult to make, slowing the policy response to changing conditions.

Alternatively, flexibility could be maintained, but the Committee could arrive at a more precise understanding of when and how it should be informed or consulted. For example, the Committee might conclude that it ought to be informed via telephone conference about any policy moves as large as \$50 or \$100 million in the borrowing assumption (or its equivalent in the federal funds rate if the Committee wishes to emphasize that in its operating strategy), and formally consulted beforehand on anything larger. Presumably, the Chairman would have the prerogative to authorize larger changes in an emergency situation. Such an understanding might be

embodied in a new version of the last sentence of the directive, which now contains the fairly wide federal funds rate ranges to trigger Committee consultation.

MEETING FREQUENCY

The current schedule of eight meetings per year evolved in 1981. Its foundation was the greater focus on the monetary aggregates; meetings around the beginning of each quarter allowed a growth rate for the upcoming quarter to be established, and mid-quarter meetings gave an opportunity to consider mid-course corrections. With less emphasis on the aggregates in conducting short-run policy, this schedule could be reconsidered.

To some extent, the desired number of meetings may depend on the Committee's decisions on the focus of policy and discretion for intermeeting adjustments. Reduced scope for adjustments between meetings might call for more frequent meetings to calibrate policy to incoming information, though greater telephone contact might work in the other direction. And concern that greater attention to the federal funds rate could make adjustments more difficult might argue for more frequent meetings to consider policy alternatives. Generally, more frequent meetings have the advantage of more timely opportunity to review new information, but they also involve the inconvenience of more preparation and travel.

From a broader perspective, the economic fundamentals probably do not change that much from month to month so as to require, say, monthly

sessions, especially considering the opportunity for telephone conferences. Weighing these factors, the current schedule of eight meetings each year might still be considered adequate.

Table 1. Difference of Funds Rate From the Desk's Expectation
 (Percentage points)
 (All days/excluding Wednesdays/excluding Wednesdays and year-ends)

	Mean difference	Mean absolute difference	Standard deviation of difference
Mar 14, 1984 - Mar 23, 1988	.11/.10/.06	.29/.25/.21	.65/.56/.29
Mar 14, 1984 - Oct 7, 1987	.12/.11/.07	.30/.26/.22	.68/.59/.30
Oct 21, 1987 - Mar 23, 1988	-.01/.03/.01	.20/.16/.16	.29/.21/.20
Oct 21 - Jan 13	-.06/.01/-.03	.23/.19/.18	.33/.24/.22
Jan 27 - Mar 23	.05/.07/na	.15/.13/na	.21/.16/na

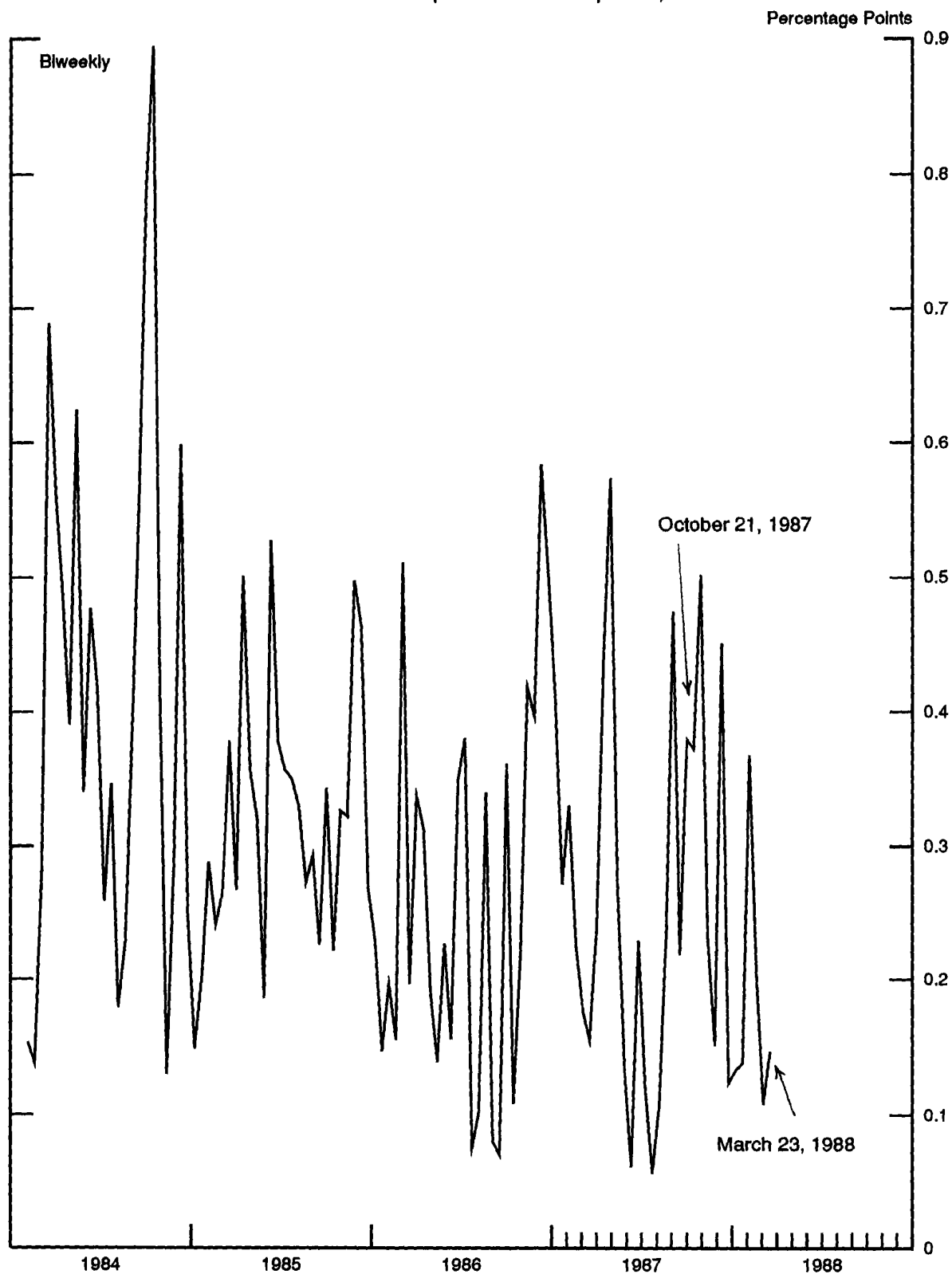
na - not applicable

1. Statistics are based on daily data. The dating of each interval refers to the last day of the reserve period.

Chart 1

Volatility of the Funds Rate Around the Desk's Expectation

(Standard deviation of the daily level of the federal funds rate around the expectation for each period*)



* Excludes days surrounding yearends.

Table 2. Difference of Borrowing From Path Assumption
(Millions of dollars)
(Including year-ends/excluding year-ends)

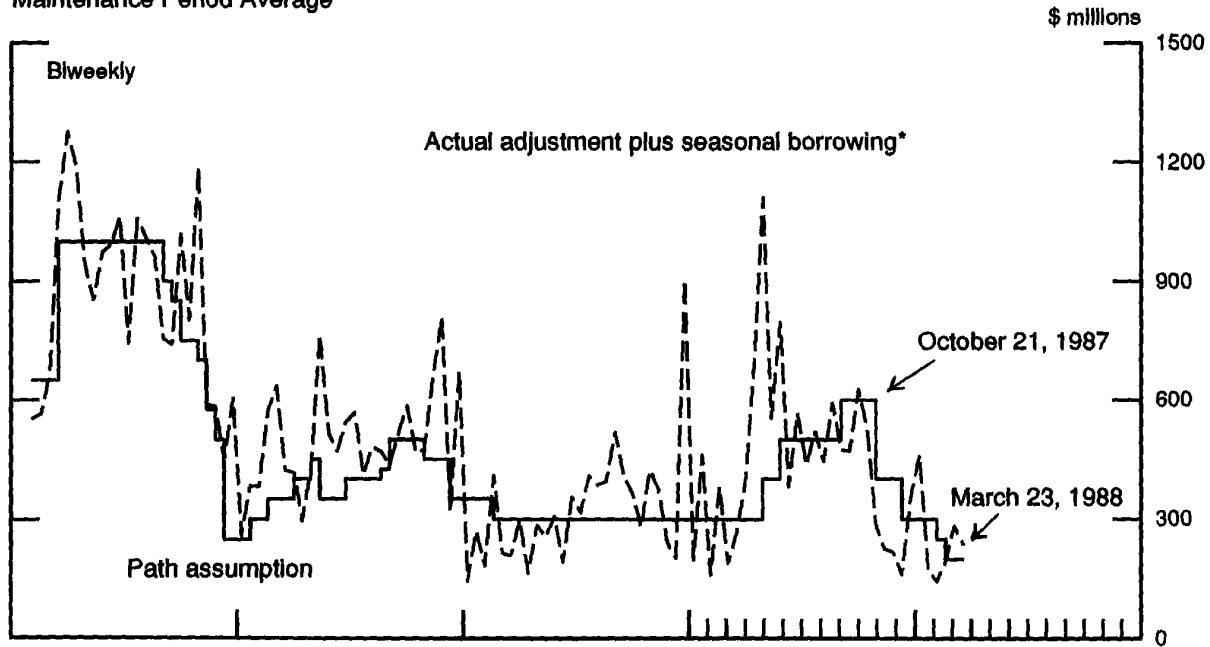
	Mean difference	Mean absolute difference	Standard deviation of difference
Mar 14, 1984 - Mar 23, 1988	49/37	124/115	167/155
Mar 14, 1984 - Oct 7, 1987	62/50	127/117	169/156
Oct 21, 1987 - Mar 23, 1988	-49/-68	105/100	111/94
Oct 21 - Jan 13	-67/-105	128/123	128/87
Jan 27 - Mar 23	-23/na	72/na	90/na

na - not applicable

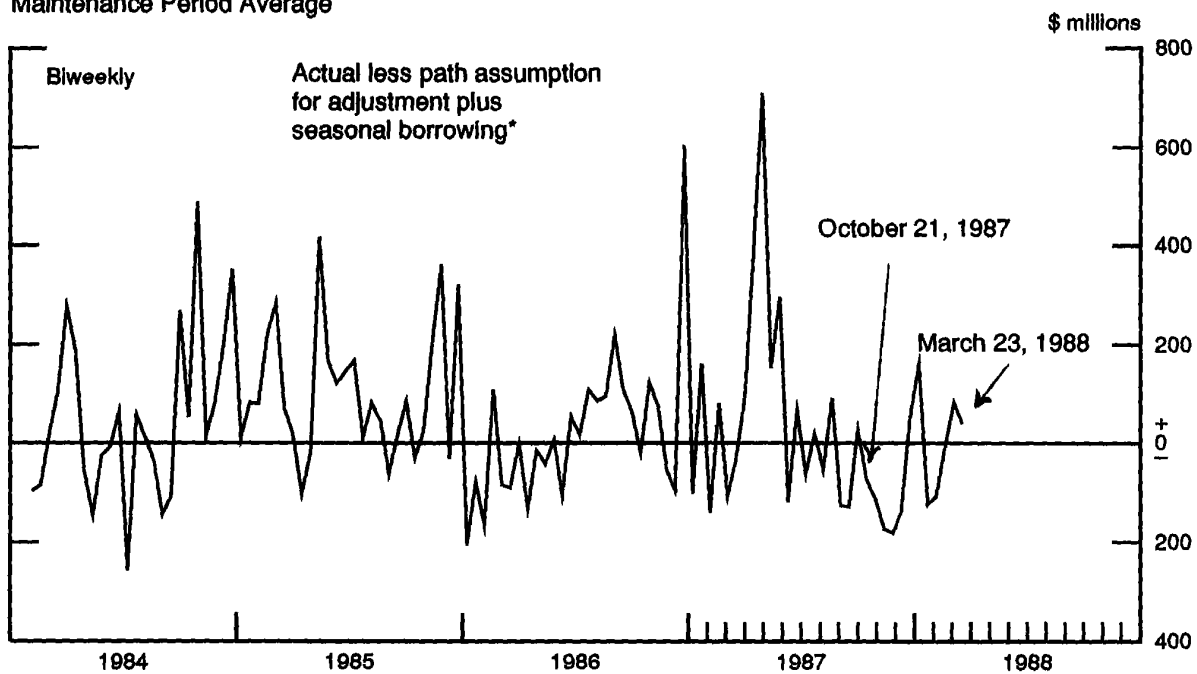
1. Statistics are based on reserve period averages. The dating of each interval refers to the last day of the reserve period.

Chart 2
Deviations of Borrowing From Path

Maintenance Period Average



Maintenance Period Average



* Excludes special situation borrowing.

March 17, 1988

Federal Reserve Policy Targets
and Operating Guides in Recent Decades: A Review*

Introduction

This report discusses the policy targets that the FOMC has followed over the last 30 years and the operating guidelines that the Trading Desk has used in undertaking open market operations. While the ultimate policy goals of economic expansion with reasonable price stability have persisted through the years, the intermediate targets have changed. Bank credit was replaced by money at the end of the 1960s. In the 1980s, as the demand for money seemed to change in a fundamental way, the Committee looked for new intermediate targets. It followed a variety of indicators in an informal way. Operating targets have changed from free reserves to the Federal funds rate to nonborrowed reserves, and recently to borrowed reserves, a very similar measure to free reserves.

There are interrelationships among all of the target variables and indicators that have been used over the years. Whenever reserves have been the primary operating target, interest rates have played a role in modifying the response, and vice versa. However, the choice of primary targets has had different implications for how the Federal Reserve responded to new developments.

*Prepared by Ann-Marie Meulendyke, Manager, Open Market Analysis Division Federal Reserve Bank of New York. The report draws heavily on the annual reports prepared by the Manager of the System Open Market Account for the FOMC and on policy records and directives. Conversations with Peter Sternlight, Paul Meek, and Irwin Sandberg, who were at the Desk during many of the years covered, provided added insights. Other source material is listed in footnotes and at the end of the paper.

First half of 1960s: bank Credit and free reserves

During the first half of the 1960s, open market policy retained essentially the same focus as in the 1950s, after the Treasury-Federal Reserve Accord had freed the Federal Reserve to pursue an independent monetary policy.^{1/} The FOMC actively pursued a contracyclical policy, using an array of measures to evaluate economic activity. Policy instructions were general and qualitative in nature. For example, in February 1962 the FOMC directed the Desk to conduct operations "with a view to maintaining a supply of reserves adequate for further credit expansion, while minimizing downward pressures on short-term rates." The Committee used the behavior of bank credit (commercial bank loans and investments) as its primary intermediate policy goal. It sought to speed up bank credit growth in periods of slow economic growth and slow it down in periods of rapid growth. Bank credit statistics were only available with a lag, however, and thus were not suitable for day-to-day operating guidance.

Accordingly, the weekly (or biweekly) operating objective was couched in terms of free reserves (excess reserves less borrowed reserves--referred to as net borrowed reserves if borrowed reserves were greater than excess reserves). A relatively high level of free reserves represented an easy policy, with the excess reserves available to the banks expected to facilitate more loans and investments. Net borrowed reserves left the banks without unpledged funds with which to expand lending, and were viewed as fostering a restrictive policy stance. It was assumed that

^{1/} Until the Treasury replaced fixed price offerings with the auction technique for selling coupon issues during the first half of the 1970s, the Federal Reserve agreed to follow a so called "even keel" policy during financing periods. Around the financing periods, the Fed avoided changes in policy stance and tried to prevent changes in money market conditions. Major financing operations occurred four times a year, around the middle of each quarter. However, extra unscheduled financing operations occurred when the Treasury found itself short of money. Debt issuance was not put on a regular cycle until the 1970s.

banks would adjust loans and investments in a passive manner when reserve availability changed.

The linkages between free reserves and bank credit were viewed at the time as somewhat complex.^{2/} High rather than rising free reserve levels were believed to foster rising bank credit since banks would perpetually have more excess reserves than they wanted and would keep expanding lending. High net borrowed reserve levels would, in a parallel manner, encourage persistent loan contraction. However, defining the point where free or net borrowed reserves was neutral--that is fostering neither rising nor falling bank credit levels--was believed to be possible conceptually, but not empirically. Other factors complicating the linkage were the distribution of reserves, loan-deposit ratios, the maturities of bank portfolios, and the strength of loan demand. None of these difficulties was considered fatal to the procedure so long as bank credit growth was monitored over time.

The FOMC instructed the Trading Desk to seek a relatively steady level of free reserves between meetings of the FOMC (usually held every 3 weeks). There was no provision for changes in the guidelines between meetings. Reserve maintenance periods were two weeks long for country banks (banks not located in cities with Federal Reserve banks or branches) and one week long for reserve city banks (generally large banks in Federal Reserve cities). Computation and maintenance periods were essentially contemporaneous.

Research staff members worked up free reserve forecasts each day which gave guidance to the Desk as to appropriate reserve adjustments.

^{2/} See "The Significance and Limitations of Free Reserves," (Peter D. Sternlight) Federal Reserve Bank of New York Monthly Review, November 1958, pp 162-167, and "Free Reserves and Bank Reserve Management." Federal Reserve Bank of Kansas City Monthly Review, November 1961, pp 10-16.

The reserve factor estimates were subject to considerable errors. Furthermore, reserves were not always well distributed across classes of banks.

Because of the errors in the free reserve forecasts and the distribution problems, the Desk took supplemental guidance each day from the "tone and feel of the markets" in deciding whether to respond to the signals being given by the reserve forecasts. Reading the tone of the markets was considered something of an art. Desk officials watched Treasury bill rates and dealer financing costs. They factored in comments from securities dealers about difficulties in financing positions. Desk officials were primarily concerned with the direction in which interest rates were moving, rather than their level, and with the availability of funding. The justification for using market tone and feel as an indicator of the accuracy of free reserve estimates was that if the banks were short of free reserves, they would sell Treasury bills, a secondary reserve, and put upward pressure on bill rates. They also would cut back on loans to dealers, thus making financing more difficult.

The Federal funds rate played a limited role as an indicator of reserve availability during this period although it gained attention as the 1960s progressed. The interbank market was not very broad as the decade began, but activity was expanding.^{3/} The Managers' reports of the 1960s cited it increasingly in the list of factors characterizing money market ease or tightness. Until the mid 1960s, the funds rate never traded above the discount rate. During "tight money periods," when the Desk was fostering significant net borrowed reserve positions, funds generally traded at

^{3/} Willes, Mark H., "Federal Funds During Tight Money," Federal Reserve Bank of Philadelphia, Business Review November 1967, pp. 3-11; and "Federal Funds and Country Bank Reserve Management," Op. Cit., September 1968, pp. 3-8.

the discount rate, and the rate was not considered to be a useful indicator of money market conditions. When free reserves were high, funds often traded below the discount rate, and showed noticeable day-to-day variation. At such times, they received greater attention as an indicator of reserve availability.

There was considerable surprise when funds first traded above the discount rate, briefly in October 1964 and more persistently in 1965. Why would any bank pay more for overnight money than the Federal Reserve charged? Such borrowing, away from the Fed, was attractive to large banks that were becoming more active managers of their balance sheets. Though it was not noted at the time, the changes were making free reserves an increasingly uncertain predictor of bank credit growth as the relationship depended upon banks responding passively to reserve availability. In 1961, banks developed wholesale CDs, which they could use to accommodate increased loan demand without having unused free reserves. The next logical step was to finance loan demand by purchasing overnight Federal funds and renewing the contract each day. Unlike CDs, takings in the funds market were not subject to reserve requirements or Regulation Q interest ceilings. (Such ceilings were dropped for most large CDs in 1970.) The discount window could not be used on such a steady basis, because the Federal Reserve continued to discourage frequent or prolonged borrowing.

The FOMC frequently had to deal with gold outflows and balance of payments problems in these years. In 1961, it developed a procedure designed to allow continued pursuit of domestic monetary preferences--which at the time were for ease since the economy was just recovering from a recession--while countering the gold outflow. The policy was referred to in internal documents as "operation nudge" and elsewhere as "operation twist." The Federal Reserve, in conjunction with the Treasury which altered its debt

issuance pattern, attempted to flatten the yield curve by purchasing coupon securities while simultaneously selling Treasury bills.^{4/} The procedure continued for another year and then disappeared from the discussion after short-term rates rose in 1963. The Manager's reports focused mostly on operational issues and reached no judgment as to whether or not the policy was effective. Econometric studies have suggested that the effect on the yield curve was minimal.

Second half of the 1960s: Transition to new targets and indicators

The formal policy procedures were changed only modestly over the latter half of the 1960s, but the period was marked by questioning and search for alternative intermediate targets and techniques for achieving them. Inflation was a growing problem, and the Annual Reports expressed considerable concern about the lack of tax increases (until late 1968) to finance the Vietnam war involvement. Interest rates rose and became more variable.

There was considerable questioning, both within and outside the Federal Reserve, about the linkages of free reserves to the ultimate goals of policy, and as to whether bank credit and money market conditions were reliable predictors of economic activity. Quantitative methods were being applied to an increasing extent to try and sort out hypothesized relationships among operational, intermediate, and ultimate policy objectives. Some of these studies suggested that more attention should be paid to money growth and to the behavior of total reserves or the monetary base.

^{4/} The purchase of coupon-bearing issues followed a period from 1953 to 1960 when the Federal Reserve concentrated its open market operations in Treasury bills. Previously, it had been pegging the whole Treasury yield curve. The "bills only" policy sought to make clear that market forces were to determine the yield curve. It was seen as having the added advantage that Fed operations would only be a small part of the total, and would not measurably change floating supplies and thus not have a big impact on rates. Twice between 1953 and 1960 coupon issues were purchased to help "correct disorderly markets."

In response to these developments, the FOMC expanded the list of intermediate guides to policy. Along with bank credit, the directives cited money growth, business conditions, and the reserve base. Free reserves continued to be the primary gauge for operations. However, borrowed reserves received increasing weight, since excess reserve behavior was variable and difficult to predict.

The Federal funds rate gained a more prominent position as an indicator of money market conditions. The 1967 Manager's Annual Report explicitly mentioned the Federal funds rate as a goal in itself rather than just as an indicator of the accuracy of free reserve estimates. It said that daily open market operations "focused on preserving particular ranges of rates in the Federal funds market and of member bank borrowings from the Reserve Banks" (page 4). The report was concerned that reserve forecast errors might lead to unintended money market firmness which market participants could misinterpret.

The FOMC met every 3 to 4 weeks, but it was still concerned that developments between meetings might alter appropriate reserve provision. In 1966 it introduced what was called a proviso clause, which set forth conditions under which the Desk might modify the approach that had been adopted at the meeting. It would have preferred to use bank credit as the trigger to change money market conditions, but data were available only with a lag. Hence, it used a proxy for bank credit in the proviso clause. After some experimentation, it adopted what it called the bank credit proxy, which consisted of daily average member bank deposits subject to reserve requirements.

Logically the bank credit proxy, which represented most of the liability side of the banks' balance sheets, should have moved in a similar fashion to bank credit, which was a large share of the asset side of their

balance sheets, but they often differed. One source of distortion was the growing use of nonreservable liabilities to finance credit extension. Banks encountered rising interest rates as inflation heated up, and Regulation Q often limited their ability to raise rates enough to attract deposits. Furthermore, higher interest rates made reserve requirements more burdensome. Consequently, banks raised money in the Eurodollar market to finance lending. In 1969, the bank credit proxy was expanded to include liabilities to foreign branches, the largest nondeposit liability. Nonetheless, the proxy continued to deviate from bank credit as reserve ratios changed.

Whenever the bank credit proxy moved outside the growth rate range discussed at the FOMC meeting, the Desk typically adjusted the target level of free or net borrowed reserves, say by about \$50 million according to present rough recollections. Sometimes the proviso clause permitted either increases or decreases in the objective for free reserves. Frequently it allowed adjustments only in one direction.

To decide each day on its operations, the Desk looked at the reserve forecasts, short-term interest rates and availability of financing to the dealers. If there was a need for reserves that was confirmed by a sense of tightness in the markets, the Desk would respond soon after the 11 o'clock conference call. It used a larger share of outright transactions than currently, partly because it engaged in less day-to-day fine tuning, but it did make active use of RPs and, after their introduction in 1966, of matched sale-purchase transactions. In 1968, lagged reserve accounting was introduced, based on deposit levels from two weeks earlier, with all banks settling weekly. The change made it easier to hit free reserve targets, ironically, shortly before free reserve targeting ended.

1976 to 1979: Targeting money growth and the Federal funds rate

In 1970, money growth formally replaced bank credit as the primary intermediate target of policy, and the Federal funds rate replaced free

reserves as the primary guide to day-to-day open market operations. The transition was gradual, with the first few years of the decade characterized by frequent experimentation and modification of the procedures. Nonetheless, the framework until October 1979 generally included setting a monetary objective, and encouraging the funds rate to move gradually up or down if money were exceeding or falling short of the objective.

Bank credit and its proxy continued for a while in the list of subsidiary intermediate targets, but they received decreasing attention. The Desk also continued to watch the behavior of both free and borrowed reserves, mostly as an indicator of how many reserves needed to be provided to keep the Federal funds rate at its desired level. They exploited the positive relationship between borrowing and the spread between the funds rate and the discount rate. The relationship was imprecise, but it gave the Desk an idea of how many free or net borrowed reserves were likely to be consistent with the intended funds rate. The Desk could continue to make use of the forecasts of reserve factors to gauge the appropriate direction and magnitude for open market operations.

Initially in 1970, the FOMC selected weekly tracking paths for M1, based upon staff projections of likely behavior. It simultaneously continued to specify desired growth of the bank credit proxy, and also indicated preferred behavior for M2, but those measures received less weight than M1.^{5/} It instructed the Desk to raise the Federal funds rate within a limited band if the monetary aggregates were well above the tracking path or to lower the funds rate within that band if the aggregates were below the tracking path.

^{5/} At the time, M1 consisted of currency and privately held demand deposits. Other checkable deposits were added in 1980. M2 consisted of M1 plus time and savings deposits at commercial banks other than large CDs. Thrift institution deposits and overnight RPs and Eurodollars and money market funds were not included until 1980.

In 1972, a number of significant modifications were made. The weekly tracking path for M1 was supplemented (and was later replaced) with two-month growth rate ranges running from the month before to the month after the FOMC meeting. The change was designed to reduce the weight given to the rather volatile weekly money numbers and to quantify significant deviations. At the end of that year, the Committee also sharpened the distinction between targeting desired money growth and targeting expected money growth. Initially, the M1 tracking path had been based on Board staff expectations. If the projected money growth was too high to sustain the desired noninflationary growth, no effort was made to set the tracking path below the projection. By late 1972, the Committee took note of that failing. It introduced six-month growth targets for the monetary aggregates explicitly designed to be consistent with economic activity and price goals.

In 1972, the FOMC also introduced a reserve operating mechanism to be used simultaneously with the interest rate guideline. Funds rate targeting was recognized as suffering from an obvious weakness. The staff had to estimate what funds rate would achieve desired money growth. The funds rate worked by affecting the interest rates banks both paid and charged customers, and in turn the demand for money. But the demand for money was also a function of nominal income and expectations about inflation. The Board staff built models of money demand as did other Federal Reserve research departments. There was much debate about these models and their accuracy through the decade. Some observers felt that the models would have done well enough over periods of meaningful length, considered to be six months to a year, if the FOMC had really allowed interest rates to move as much as the models required. Others felt that it was not practical to control money adequately by working through the demand side, either because the models

were not reliable enough or because the interest rate consequences threatened to be too disruptive to markets.

The other potential approach to monetary control, which was widely touted in the academic community, was to work from the supply side. If the provision of total reserves were controlled, it was argued, then money growth would be constrained through the reserve requirement ratio. There was concern, however, that the approach would cause undesired short-run volatility of interest rates. To limit money market volatility, the FOMC tried reserve targeting but with a constraint on the funds rate.

One technical problem was that total reserves were subject to change for reasons unrelated to money growth. In particular, interbank and Government deposits were excluded from all the money definitions, but were subject to reserve requirements. Government deposits varied far more than they have in recent years. All tax and loan account monies were kept in demand deposits subject to reserve requirements until 1977 when a legal change permitted note option accounts which pay interest and are not subject to reserve requirements. To take account of the reserve requirements on deposits not in the money definitions, the Federal Reserve developed a measure called reserves on private deposits or RPD. While RPD behavior was closer to that of M1 than was total reserves, the linkage was not very close because reserve requirements differed widely according to the size and membership status of the bank. Movements of deposits between large and small banks or member and nonmember banks changed the ratio of RPD to M1. Changes in the ratio of currency to deposits also affected the relationship between RPD and M1.

The FOMC set two-month growth target ranges for RPD based on staff estimates of the various ratios and instructed the Desk to alter its reserve provision in a way designed to achieve them. The actions were also supposed to be consistent with achieving a specified Federal funds rate each week,

which could be moved within a band between meetings. Usually the band was 1 to 1 1/4 percentage points wide. Intermeeting intervals were 4- to 5-weeks long. Unfortunately for the experiment, the relatively narrow funds rate constraint often dominated, and the Desk frequently missed the RPD target. RPD targets were declared unachievable, although the funds rate constraint precluded a true test. In time, RPD's status changed from operational target to intermediate target, where it took its place along with M1 and M2. Since information was about as good on the behavior of M1 as it was on RPD, RPD gradually fell into disuse. It was dropped as an indicator in 1976.

Subsequent modifications to techniques mostly related to the nature of the monetary targets. In 1975, under pressure from the Congress, the Federal Reserve adopted annual monetary target ranges and announced them publicly. A growth cone was drawn from the base period which was the calendar quarter most recently concluded. Each quarter, the target range was moved forward one quarter. The procedure meant that by the time the annual target period was completed, the target had been superseded. Frequently, the targets were overshot, and complaints about upward base drift were legion. The "Humphrey-Hawkins" Act of 1978 established the current procedure which required the Federal Reserve to set targets for calendar years and to explain any misses.

Along with the annual targets set in February and reviewed in July, the Committee, as noted, also set two month ranges. In theory, the two-month money growth targets were supposed to be consistent with returning to the annual target range if the money measures were outside the range, and with holding the aggregates within the ranges if they were already there. In practice, if the changes in the funds rate that the staff estimated were likely to be needed to get money back on target were unacceptable to the Committee, it would approve growth rates that stretched out the period for

bringing money back on track, or even acknowledge that target growth probably would not be achieved within the year.

As the decade progressed, the control of the Federal funds rate tightened. The range set to guide the Desk between meetings tended to narrow, and changes made at the meetings generally were small. Frequently, the range surrounded the most recent funds rate target. In the early 1970s, according to current recollections, the intermeeting funds rate range was generally $5/8$ to $1\ 1/2$ percentage point wide. By the latter part of the decade, its width was usually about $1/2$ to $3/4$ percentage point, and on a couple of occasions only $1/4$ percentage point. In addition, the aggregate ranges were often set in a way that made it likely that the funds rate would only move in one direction, effectively cutting the range in half.

In implementing the funds rate targeting procedure, the Desk became increasingly sensitive to preventing even minor short-term deviations of the funds rate from target. It felt some constraint not to make reserve adjustments in an overt way unless the funds rate moved off its target. When reserve estimates suggested a large adjustment was needed but the funds rate did not confirm it early in a statement week, the Desk would worry about the feasibility of doing a very large open market transaction late in the week. The Desk increasingly used internal transactions with foreign accounts and, after they were introduced in 1974, it used customer RPs to add reserves at times when the funds rate was on target but a reserve need was projected. (Market participants were accustomed to reading no policy significance to outright transactions for customers and initially regarded customer RPs the same way.)

If the need was too large for these techniques, the Desk often pounced on very small funds rate moves off target. A $1/16$ percentage point deviation would lead the Desk to arrange an RP or MSP transaction if the

rate move were in the direction consistent with the reserve estimates. If the funds rate moved off target in the "wrong" direction, the Desk typically would allow a 1/8 percentage point deviation before it would feel forced to do a small operation. There was an operational limit to how late in the day transactions could be done for same day reserve effect. The cutoff was supposed to be 1:30 p.m., but if the desired funds rate move occurred just after that time, the Desk responded if it was anxious to do an operation. The end of its operating time was close to 2:00 p.m. by 1979.

The Desk's prompt responses to even small wiggles in the Federal funds rate led banks to trade funds in a way that kept the rate on target. Except near day's end on the weekly settlement day, a bank short of funds would not feel the need to pay more than the perceived target rate for funds. Likewise, a bank with excess funds would not accept a lower rate. Rate moves during the week were so limited that they provided little or no information about reserve availability or market forces. Probably few, if any, in the Federal Reserve really believed that brief small moves in the funds rate were harmful to the economy. The tightened control developed bit by bit without an active decision along the way.

1979 to 1982: Monetary aggregates and nonborrowed reserves

In October 1979, the FOMC radically changed the way it operated to achieve the monetary targets. It explicitly targeted reserve measures derived to be consistent with desired quarterly growth rates of M1. The constraint on the Federal funds rate applied only to weekly averages, and not to brief periods during the week. It was set wide enough to allow significant adjustments if needed to achieve the monetary target. Persistent overshoots of money targets and severe inflation had changed priorities. Interest rate volatility, so feared when the RPD targets were developed in 1972, seemed more tolerable.

Operationally, the FOMC chose desired growth rates for M1 (and M2) that covered a calendar quarter and instructed the staff to estimate consistent levels of total reserves. The process resembled that used to estimate RPDs. The staff estimated deposit and currency mixes to derive average reserve ratios and currency-deposit ratios. They used econometric models supplemented by some judgment. From the total reserve target, the Desk derived the nonborrowed reserve target by subtracting the initial level of borrowed reserves that had been indicated by the FOMC. The initial borrowing level was intended to be consistent with the desired money growth. If it were not, money and total reserves would exceed or fall short of path. If the Desk only provided enough reserves to meet the nonborrowed reserve path, borrowing would automatically rise if money growth (and total reserve demands) were excessive, or fall if such growth were deficient. The borrowing move would affect reserve availability and the funds rate, and encourage the banks to make adjustments that would accomplish the desired slowing or speeding up of money growth.

To reduce overweighting of weekly movements in money, the total and nonborrowed reserve paths were computed for intermeeting average periods, or two subperiods if the intermeeting period were long. (In 1979 and 1980 the FOMC met 9 and 10 times; in 1981 it moved to the 8 meeting schedule in use today.) The price paid for this averaging technique was that errors in the early part of the period had to be offset by large swings in borrowing in the final week. Informal adjustments were made to eliminate these temporary spikes or drops in borrowing that were deemed inconsistent with the longer term pattern. While the adjustments were considered necessary to avoid severe swings in reserve availability and interest rates, they gave the appearance of "fiddling" and have led to considerable confusion in the literature. Each week the total reserve path and actual levels were

reestimated, using new information on deposit-reserve and deposit-currency ratios.

In implementing the policy, the Desk emphasized that it was targeting reserves and not the funds rate by entering the market at a standard time to perform its temporary operations. It confined outright operations to longer term reserve needs and arranged them early in the afternoon for future delivery. The Federal funds rate was not ignored. It was used as an indicator of the accuracy of reserve estimates, although it was not always that reliable. On the margin, it could accelerate or delay by a day or so the entry to accomplish a needed reserve adjustment, but its role was much diminished.

While the wider swings that occurred in the Federal funds rate had been expected, the extent of the swings in the short-term growth rates of the monetary aggregates came as something of a surprise. In part, the sharp movements in both interest rates and money probably reflected the underlying conditions. The effort to turn around almost 1 1/2 decades of building inflationary expectations, which had come to permeate economic relationships, forced major adjustments. Expectations about inflation and economic activity were very fluid, and subject to sharp swings as people tried to evaluate all of the adjustments and new information.

The control mechanism itself almost assured that money growth would cycle around a trend. Every time money rose above its desired level, borrowed reserves would rise automatically. They would not decline until money growth, and hence total reserve growth, started to slow. The higher borrowing would slow money growth, but with a lag. By the time borrowing finally fell, it would have been high too long, assuring that money growth would fall below the desired level. The risk of overadjustment of money had been recognized from the beginning. Some saw it as a necessary antidote to the earlier procedure which moved the funds rate too little too late.

1983 to the present: Monetary and economic objectives with borrowed reserve targets:

A breakdown in the relatively close linkage between M1 and economic activity, rather than dissatisfaction with the procedures, led to the next set of changes, although there was also some sentiment that short-term rate volatility had been excessive. By the latter part of 1982, it was becoming apparent that the demand for money, particularly M1, was rising, and the relatively limited growth being sought to break the inflationary cycle was more restrictive than recent experience would have suggested. Some of the increase in the demand for money was attributed to the ongoing deregulation of interest rates on various classes of deposits. NOW accounts were making it more attractive to hold savings in M1. The FOMC had hoped that M2 would continue to be a reliable indicator, and for a few months at the end of 1982 it attempted to use it as a guide to building total and nonborrowed reserve targets. However, MMDAs, which were authorized beginning in December 1982, proved very attractive, and the demand for M2 rose sharply.

The FOMC followed ad hoc procedures hoping that they would prove to be temporary until the behavior of the aggregates settled down. The FOMC focused on measures of inflation and economic activity to supplement the aggregates. Instead of seeking total reserve levels directly linked to some aggregate and deriving a level of borrowing that moved with the deviations of the aggregate from target, it chose the borrowed reserve level directly, with the intention of adjusting it up or down whenever money seemed to be deviating in a meaningful way (after making allowance for distorting factors and taking account of the supplemental indicators).

The monetary aggregates did not quickly resume their prior relationship with economic activity. Declining inflation made holding money more attractive, and interest rate sensitivity increased, since rates on some components of M1 were close to market rates but slow to change. Policy

decisions continued to be guided by information on economic activity, inflation, foreign exchange developments, and financial market conditions. In time, money growth itself joined the list of factors shaping adjustments to the borrowing level. What started out, apparently, as a temporary procedure has persisted, with modifications, for over five years.

There is clearly some resemblance between targeting borrowing and targeting free or net borrowed reserves as was done in the 1950s and 1960s.^{6/} As in the 1960s, the reserve forecasts played an important role in the decision each day as to whether to provide or drain reserves. Money market conditions, this time specifically the funds rate, have supplemented the reserve forecasts, particularly in choosing the days on which operations are conducted and the instruments used to make the reserve adjustments.

^{6/} Mechanically, the only difference is excess reserves. Estimating the demand for excess reserves became more complex in the 1980s when the Monetary Control Act extended reserve requirements to nonmember banks and thrifts.