

---

DOMESTIC OPEN MARKET OPERATIONS  
DURING 1998

---

February 1999

# OPEN MARKET OPERATIONS DURING 1998

## *FEDERAL RESERVE BANK OF NEW YORK, MARKETS GROUP*

### **I. IMPLEMENTATION OF MONETARY POLICY IN 1998**

Directives of the Federal Open Market Committee  
Overview of Operating Procedures and Practices  
New Developments in 1998  
Sweep Programs and Required Operating Balances

### **II. OUTRIGHT TRANSACTIONS IN THE SYSTEM OPEN MARKET ACCOUNT**

Changes in the Size of the System Open Market Account  
Factors Affecting the Need for a Change in the SOMA Portfolio  
Desk Activity Affecting the SOMA Portfolio

### **III. TEMPORARY ACTIVITY FOR THE SYSTEM OPEN MARKET ACCOUNT**

Determinants of the Size and Structure of Temporary Open Market Operations  
Temporary Open Market Operations Arranged in 1998

### **IV. EXCESS RESERVES AND THE FEDERAL FUNDS RATE**

Excess Reserve Levels  
The Behavior of the Federal Funds Rate

### **APPENDIX A: DAILY MEASURES OF THE FEDERAL FUNDS RATE**

### **APPENDIX B: AUTHORIZATION FOR DOMESTIC OPEN MARKET OPERATIONS**

### **APPENDIX C: OPERATIONS IN GOVERNMENT SECURITIES AND FEDERAL AGENCY SECURITIES; U.S. TREASURY AND FEDERAL AGENCY SECURITIES IN THE SYSTEM OPEN MARKET ACCOUNT**

# DOMESTIC OPEN MARKET OPERATIONS DURING 1998

## I. IMPLEMENTATION OF MONETARY POLICY IN 1998

### **Directives of the Federal Open Market Committee**

In 1998, each directive issued by the Federal Open Market Committee (FOMC) instructed the Trading Desk at the Federal Reserve Bank of New York to foster conditions in reserve markets consistent with maintaining the federal funds rate at an average around a specified rate. The FOMC lowered the federal funds rate it sought on three occasions, each time by 25 basis points, and on two of these occasions the Board of Governors also approved an equal-sized reduction in the discount rate (Table 1). The reduction in the funds rate in September was the first policy adjustment since March 1997.

### **Overview of Operating Procedures and Practices**

The Desk used open market operations to align the supply of reserve balances with the level of demand believed consistent with maintaining the funds rate around its intended level. Each morning, the Desk considered whether an operation was needed on the basis of estimates of reserve demand and supply. Any operation designed to alter reserve balances that same day was typically arranged shortly thereafter. Reserve needs in upcoming days and weeks also were considered and sometimes influenced the choice of operations, as did an assessment of possible forecast errors. Current trading conditions in the funds market, which could contain insights into reserve imbalances, also played a role in the selection of operations.

Two-week maintenance periods define the time frame over which banks can accumulate daily balances at the Federal Reserve to meet their period-average requirements.<sup>1</sup> The nonborrowed reserve objective, or “path,” that the Desk develops for each maintenance period captures the demand for reserves for that period arising from reserve requirements and the estimated demand for excess reserves, after subtracting an allowance for expected discount window borrowing associated with the funds rate objective. As the period progresses, the allowances for excess reserves and borrowing are revised if incoming information suggests they are inconsistent with maintaining the funds rate around the FOMC’s target.<sup>2</sup> When compared with

---

<sup>1</sup> Carryover allowances provide banks with some flexibility to use balances in one period to meet requirements in another period. End-of-day overdrafts are discouraged actively, which limits the flexibility banks have to substitute positions on different days within the same maintenance period to meet requirements.

<sup>2</sup> As has been the case for several years, adjustment borrowing was generally quite low in 1998, and the borrowing allowance mostly reflected expected levels of seasonal borrowing.

*Adapted from a report to the Federal Open Market Committee by Peter R. Fisher, Executive Vice President of the Federal Reserve Bank of New York and Manager of the System Open Market Account. Spence Hilton was primarily responsible for the preparation of this report. Many other members of the Markets Group assisted in the preparation; Angela Goldstein and Wendy Wong provided invaluable research support.*

Table 1

**Changes in the Federal Funds Rate Specified in the FOMC Directive**

---

Date of Change	Expected Federal Funds Rate (Percent)	Associated Discount Rate (Percent)
3/25/97	5 ½	5
9/29/98	5 ¼	5
10/15/98	5*	4 ¾
11/17/98	4 ¾	4 ½

---

\* First change made between regular FOMC meetings since April 18, 1994.

estimates of average reserve supply for the period, the path provides a general indication of the overall need for open market operations, but the specific operational strategies employed by the Desk are driven largely by the estimated daily patterns of both demand and supply and the behavior of the funds rate.

The Committee's objective for the funds rate will be achieved if the rate is sufficiently certain to trade close to the indicated target over the long run, so that temporary deviations from the target do not influence other asset prices. With this in mind, the Desk views its objective as keeping the funds rate on current and future days as close to the target as possible. While this may be accomplished if the rate averages close to the target over time, the Desk does not target an average rate over any preset time frame, nor does it try to offset firm days with soft days or vice versa.

The Desk recognizes that there can be intraday volatility in the funds rate. Over the course of a day, there may be shifts in both demand conditions and in market perceptions of supply. Also, the Desk may not correctly estimate demand and supply, and the only late-day mechanism to address reserve market imbalances is borrowing through the discount window, which can only add reserves and which is not actively used by banks. The potential for intraday volatility is greatest at the end of the day, and particularly on days when reserve supply is particularly high or low relative to the level of balances needed to meet all requirements. The Desk must assess the intraday volatility that is likely to result from its planned reserve provision, and the impact that rate movements could have on reserve market conditions in subsequent days.

Assessments of the dynamics of how the funds rate may behave in upcoming days will guide the Desk's decisions about the supply of reserves provided to counter a current imbalance in the funds market. For example, the Desk may feel that the amount of reserves necessary to bring a firm funds rate close to the target rate risks placing the banking system further ahead than desired for meeting period average reserve

---

requirements, and that this could make it difficult to steer the funds rate to the target on subsequent days. Low levels of reserve supply in subsequent trading sessions could risk upward spikes in the funds rate when banks would be looking to cover their late-day overdrafts.

Past deviations of the fund rate from target factor into current decisions to the extent that they influence current or expected future funds market conditions. In practice this means that, at times, the Desk may be asymmetric about the risk it is willing to take that there is a deviation in one direction or the other if the funds rate has traded significantly above or below the intended level for several days. For example, if the funds rate has been trading significantly above the target for several days, the Desk may be more inclined to risk engendering a soft funds rate than to risk another firm day. But the Desk does not aim for a funds rate below the target in order to bring the average rate closer to the target over a longer period of time.

### **New Developments in 1998**

The Board of Governors approved a return to a lagged reserve accounting (LRA) framework beginning with the maintenance period ended August 12, 1998. This new accounting structure replaced the contemporaneous reserve accounting system (CRA) that had served since 1984. Under LRA, a depository institution's reserve requirement depends on its average reservable deposit liabilities in a two-week computation period that ends seventeen days before the start of the corresponding reserve maintenance period. The computation period for applied vault cash, which was lagged one period even under CRA, was shifted back further to coincide with the computation period for reservable liabilities. Under LRA, the Desk knows with virtual certainty the aggregate level of reserve requirements at the outset of each maintenance period, and each depository institution subject to two-week requirements knows its own needs. The return to LRA has removed this source of error from the Desk's estimates of reserve demand, which was a principal reason for its adoption, although the limited experience with LRA prevents an evaluation at this time of its impact on the Desk's ability to control the funds rate. Of course, other sources of uncertainty about reserve demand remain.

At its February meeting, the FOMC expanded permanently the intermeeting period limit that the Desk has for making changes in the SOMA portfolio through permanent operations. The limit, or "leeway," was lifted to \$12 billion, from \$8 billion. The move recognized that sizable changes to the portfolio are occasionally needed to deal with large shifts in reserve supply. At that same meeting, the Committee removed the Desk's authorization for making transactions in bankers acceptances because operations in acceptances are not a practical means of affecting reserves. The Committee had instructed the Desk to discontinue the use of repurchase agreements involving bankers acceptances in 1984, and had suspended their use in outright transactions in 1977.

At its November meeting, the FOMC modified its authorization for domestic open market operations by extending the maximum maturity on repurchase agreements (RPs) the Desk may arrange to sixty calendar days from the previous fifteen-day limit. The expanded maturity limit provides the Desk with additional means for addressing reserve shortages that are temporary in nature, but which are certain to exceed in length the fifteen-day maturity horizon previously set for RPs. In line with market practice, the Desk offers each counterparty one right of substitution on any RP that is greater than fifteen days in length and two rights of substitution of collateral for each operation greater than thirty days. No right of substitution remains the norm for operations of up to fifteen days. The use of long-term RPs in 1998 is discussed below.

Also in 1998, the Desk modified some of its market practices for making outright purchases, reducing the maturity interval of each coupon purchase operation and, for the first time, considering propositions for Treasury inflation-indexed securities across all maturities together in one operation. These developments are discussed further in the section on Desk Activity Affecting the SOMA Portfolio.

### **Sweep Programs and Required Operating Balances**

The adoption of programs by depository institutions to “sweep” reservable liabilities into nonreservable liabilities over the past few years has led to a significant decrease in required reserves and in required operating balances—the level of balances at the Federal Reserve that depository institutions must hold to meet that portion of required reserves not satisfied with vault cash and to meet required clearing balances.<sup>3</sup> In 1998, the spread of sweep accounts slowed as the proportion of deposit accounts not already covered by sweep programs diminished, and as institutions confronted the limits to the profitable expansion of sweeps that occur when reserve requirements are met entirely with vault cash. Moreover, a smaller portion of the resulting decline in reserve requirements translated into a reduction in required operating balances.

The level of deposits affected by new or expanded sweep programs in 1998 rose \$60 billion, an increase that was nearly \$25 billion less than in the previous year and only about half the increase of 1996 (Chart 1).<sup>4</sup> Demand deposits and other checkable deposits fell \$34 billion as the depressing effect of sweeps was partly countered by higher demand for liquid balances arising from more rapid income growth and declining opportunity costs of holding money.<sup>5</sup> As a result, required reserves fell \$3 ½ billion on

---

<sup>3</sup> In this report, required operating balances are defined as the sum of required clearing balances plus required reserves less applied vault cash. As-of adjustments, however, also influence the level of balances an institution is required to hold at the Federal Reserve in a maintenance period.

<sup>4</sup> These figures apply to deposits initially swept by banks at the start of a program or when the coverage was expanded. The data are not updated to include any later changes in the underlying deposit balances included in an existing program.

<sup>5</sup> The change in deposits is measured using not seasonally adjusted data from December 1997 to November 1998. The decline over this time span best correlates with the change in reserve requirements over the year because the switch to LRA created a lag of about 1 month between deposit levels and reserve requirements.

Chart 1

**DEPOSITS AFFECTED BY NEW OR EXPANDED SWEEP PROGRAMS**  
monthly averages

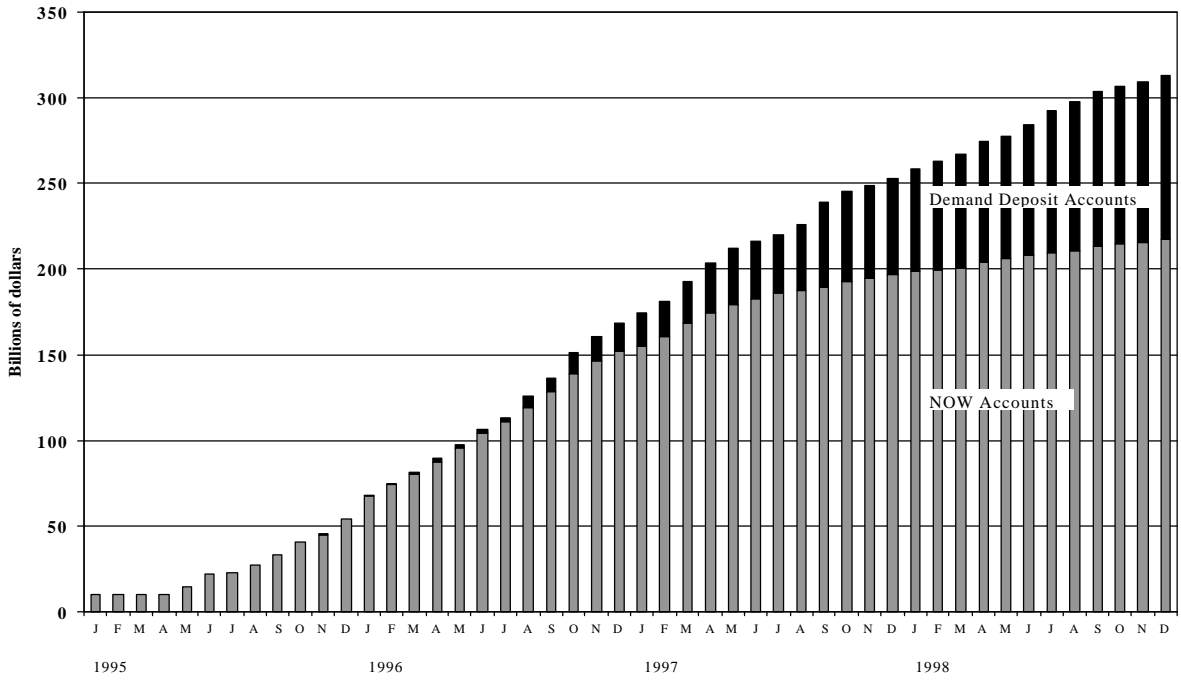
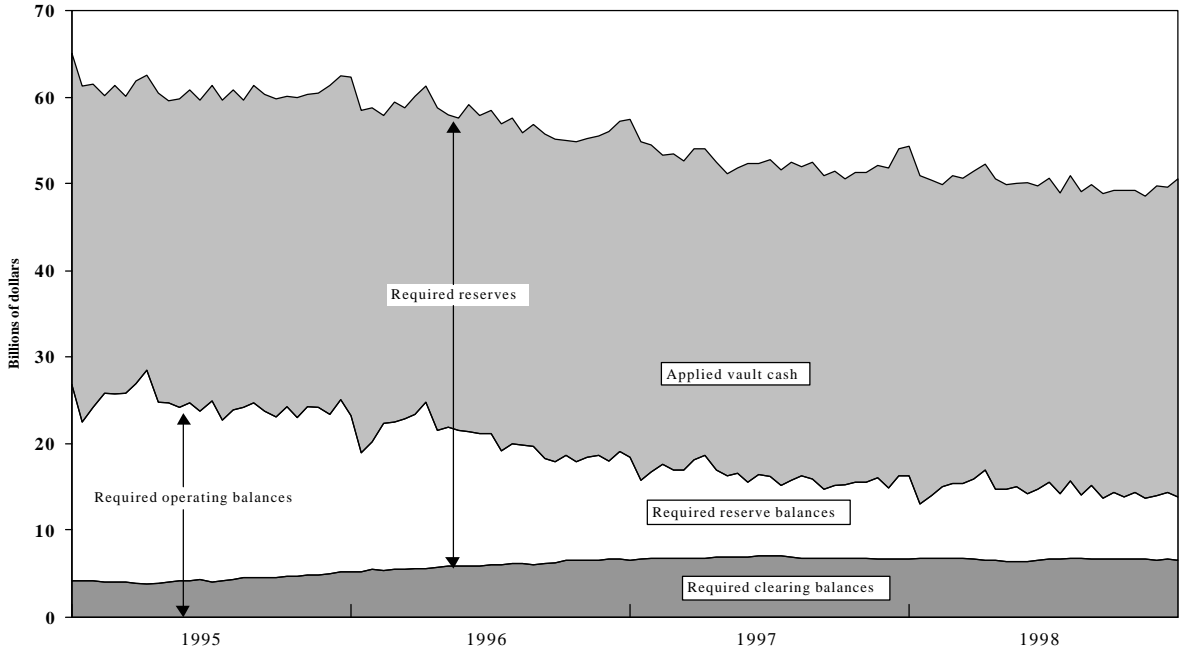


Chart 2

**RESERVE MEASURES**  
maintenance period averages



balance between the final maintenance periods of 1998 and 1997 (Chart 2). Required operating balances during this same time dropped \$2 ½ billion, as applied vault cash fell by \$1 billion and required clearing balances were little changed. The decline in required operating balances in 1998 was similar in size to the \$2 ¾ billion drop of 1997 and much less than the \$6 billion fall in 1996. But comparing changes in these reserve measures in 1998 with earlier years is complicated by the switch to LRA during the year, which altered the timing of large seasonal swings in required reserves and applied vault cash around the year-end.<sup>6</sup> Absent this effect, required operating balances would have shown little change on balance in 1998.

The smaller decline in required operating balances reflects both the slowing in the spread of sweep accounts and the fact that many of the reserve requirements that were eliminated with new sweep programs in 1998 had previously been met with vault cash rather than with balances at the Federal Reserve. Some banks have economized on their vault cash holdings by adopting tighter inventory control methods, thereby opening more room for a worthwhile expansion of sweep accounts even if the affected reserve requirements had been met with vault cash. Even though the decline in required operating balances slowed, balances currently stand at historically low levels, and the potential for some further cuts remains.

## II. OUTRIGHT TRANSACTIONS IN THE SYSTEM OPEN MARKET ACCOUNT

### Changes in the Size of the System Open Market Account

In 1998, the portfolio of domestic securities in the System Open Market Account (SOMA) grew by \$25 billion, ending the year at a level of \$473 billion (Chart 3).<sup>7</sup> Most of the expansion was achieved through outright purchases in the market made by the Desk, and only a small portion was obtained through purchases from foreign accounts. The increase was needed to offset the impact of movements in operating factors on nonborrowed reserve supply. The growth this past year was well below the record \$41 billion expansion of 1997, largely reflecting differences in the size of reserve shortages that were left to be addressed with temporary operations over recent year-ends.<sup>8</sup>

---

<sup>6</sup> The shift to LRA left the level of reserve requirements in the final maintenance period of 1998 about \$2 billion below the level it would have been under CRA because the seasonal rise in requirements that typically had occurred in the final maintenance period of the year under CRA occurs about two maintenance periods later under LRA. For related reasons, the move to LRA left the level of applied vault cash in the final maintenance period of the year about \$3/4 billion higher than it otherwise would have been.

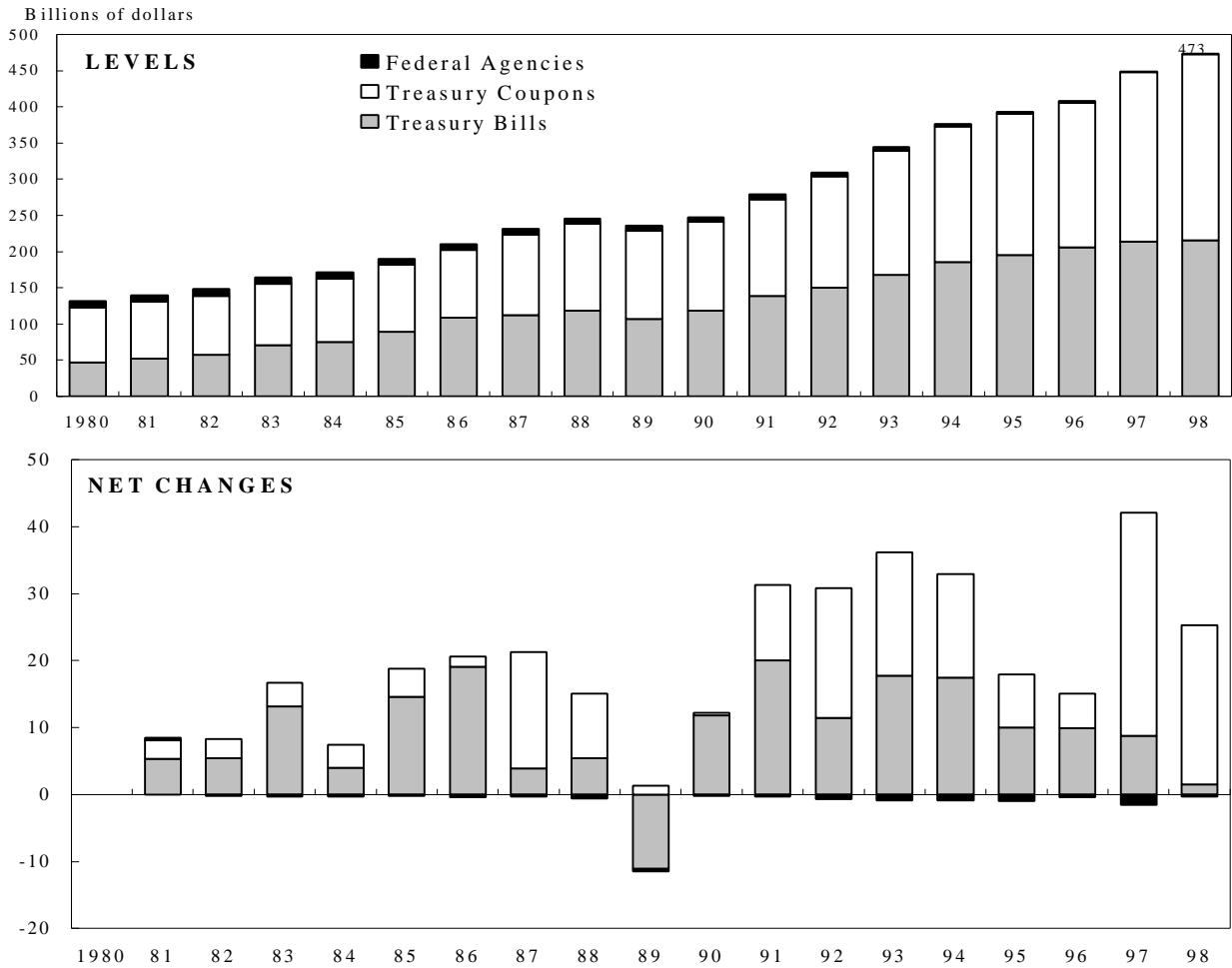
<sup>7</sup> All figures on SOMA holdings in this report are par values unless otherwise stated and exclude any securities held under outstanding RPs. Treasury bill holdings include the portion sold to foreign accounts under matched-sale repurchase agreements. Reported changes and levels of Treasury coupon securities do not include the accrual of compensation for the effects of inflation on the principal of inflation-indexed issues. At the end of 1998, these accruals totaled \$79 million, \$56 million higher than one year earlier.

<sup>8</sup> The attribution of changes in the portfolio from year-end to year-end either to factor movements over the year or to year-end reserve management strategies is based on the accounting identity:

$$\begin{aligned} \text{PORT}_{\text{end98}} - \text{PORT}_{\text{end97}} = & \text{RP}_{\text{end97}} - \text{RP}_{\text{end98}} - \text{DFACTORS}_{98} + \text{RR}_{\text{end98}} - \text{RR}_{\text{end97}} \\ & + \text{ER}_{\text{end98}} - \text{ER}_{\text{end97}} + \text{BR}_{\text{end97}} - \text{BR}_{\text{end98}} \end{aligned}$$



Chart 3  
**SYSTEM PORTFOLIO OF TREASURY AND  
 FEDERAL AGENCY SECURITIES**  
 year-end holdings



### Factors Affecting the Need for a Change in the SOMA Portfolio

#### *Changes in the Supply and Demand for Nonborrowed Reserves*

The expansion of the portfolio in 1998 was driven primarily by the need to offset the reserve drain caused by continued strong growth in currency in circulation, which increased by nearly \$35 billion during the year, similar in percentage terms to the previous year's increase (Table 2). On balance, factors other than currency affecting supply were little changed over the year. The \$3 ½ billion decline in required reserves

---

where **PORT** is the size of the portfolio, **RP** is the value of RP agreements outstanding, **ER** is the level of excess reserves, **BR** is discount window credit, and **RR** is the level of reserve requirements, each for the end of the indicated year. **DFACTOR** reflects the net impact of changes throughout 1998 in all operating factors on reserve supply. The formula is general and applies to all sets of dates. Changes in discount window borrowing affecting reserve supply and excess reserve demand were not substantial relative to other factors during the year and are not considered explicitly in the text. In the tables and charts in this report, values for the portfolio are taken from year-end dates while values for RPs outstanding and changes in factors are based on averages taken from maintenance periods near the year-end.

Table 2

**Required Reserves and Factors Affecting Nonborrowed Reserves**

(billions of dollars)

	Levels in maintenance period ending			Impact of Change on Reserve Supply	
	Jan. 1, 1997	Dec 31, 1997	Dec 30, 1998	1997	1998
<b>Required Reserves</b>	50.6	47.4	44.0	3.2	3.4
<b>Factors affecting Nonborrowed Reserves</b>					
Currency in Circulation	448.1	479.3	514.0	-31.3	-34.7
Foreign Currency	16.2	16.6	17.4	0.4	0.8
Foreign RP Pool	14.0	17.0	19.4	-3.0	-2.4
Gold and Foreign Deposits	20.6	20.1	20.1	-0.5	0.0
Float	2.0	0.8	2.6	-1.2	1.8
Treasury Balance	6.0	4.9	6.3	1.1	-1.4
Applied Vault Cash	38.1	37.7	36.7	-0.4	-0.9
Required Clearing Balances	6.6	6.7	6.6	-0.1	0.0
All Other Items	24.3	23.3	25.4	-1.0	2.1
Net Changes in Nonborrowed Factors	--	--	--	-36.0	-34.7
<b>Outstanding RPs</b>					
Par value	16.3	10.1	15.2	-6.2	5.1
Premium	1.4	0.5	1.1	-0.8	0.6

Notes: A decline in required reserves is counted as a rise in reserve supply. All Other Items equals all other assets minus all other liabilities not listed in the table, and excludes the premium on RPs.

offset a fraction of the decline in supply arising from net factor movements. Altogether, these movements in nonborrowed reserve factors and required reserves deepened reserve shortages a little more than \$30 billion in 1998, slightly less than their net impact in 1997.

*The Impact of Year-End Reserve Management Strategies*

Shifts in year-end reserve management strategies explain why the increase in the SOMA portfolio in 1998 was so much smaller than in the preceding year despite the similarity in net movements in operating factors in each of the past two years. The Desk has used very different combinations of outright purchases and RPs to address the large seasonal reserve shortages around recent year-ends, in each case reflecting in part its views of the reserve situation that would emerge under different strategies when the late-year seasonal reserve shortages unwound.

Reserve shortages addressed with RPs over the 1998 year-end were about \$6 billion higher than over the preceding year-end (Table 2). Total outstanding RPs over the most recent year-end period included \$8 billion of long-term operations with maturities greater than 15 days. These long-term RPs addressed some of the deep year-end shortages that were expected to reverse themselves early in 1999. In their absence, more outright purchases likely would have been undertaken to fill a greater portion of the year-end deficiencies.

The shift in year-end reserve management strategies from 1996 to 1997 also elevated the quantity of outright purchases made in 1997, further increasing their size relative to the volume of outright purchases subsequently made in 1998. In late 1996, the Desk limited the outright purchases it made, thereby enlarging the amount of RPs in place over the 1996 year-end. At that time, the Desk wanted to avoid having to drain reserves early in 1997 when operating balances were expected to reach an unprecedented low level. The Desk did not feel the need to adopt this strategy for the 1997 year-end given how well banks had adjusted to the lower levels of operating balances early that year. So additional outright purchases were made in 1997 as reserve needs grew over the year that brought back down the amount of RPs that had to be used to address reserve shortages over the year-end.

### **Desk Activity Affecting the SOMA Portfolio**

#### *Outright Market Activity*

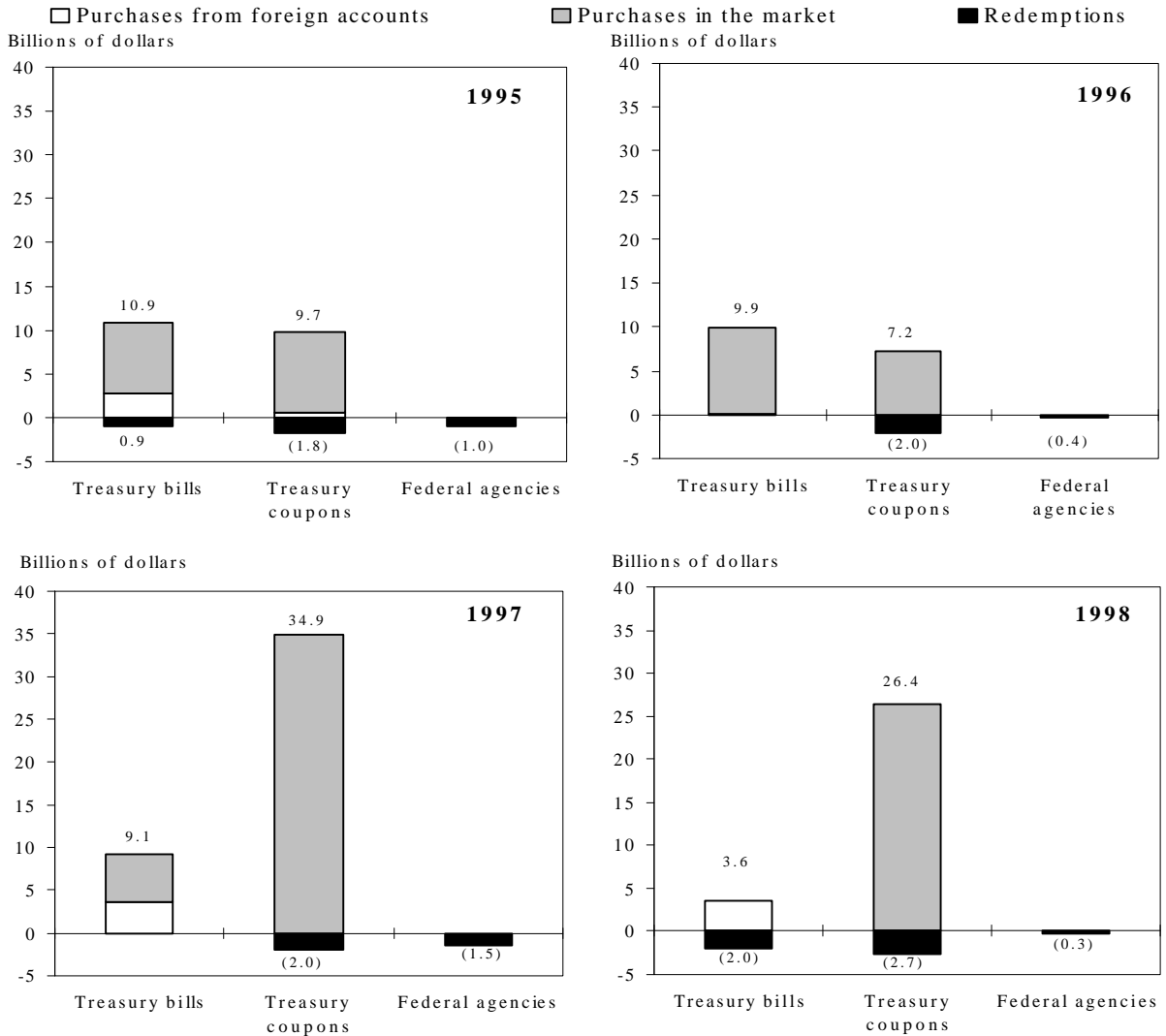
Virtually all of the expansion of the portfolio in 1998 was achieved through \$26.4 billion of outright purchases made in the market (Chart 4). Only Treasury coupon securities were bought in the market. Because of the relatively low level of Treasury bill issuance over the past two years, the Desk refrained from making direct purchases of bills in the market out of concern that any reduction in the supply of bills available to the public might diminish bill market liquidity further. At the same time, existing bill holdings in the portfolio were viewed as sufficient for addressing any unforeseen contingency.

The Desk continued to segment its market purchases of coupon issues into separate tranches covering different portions of the yield curve. Beginning in October, the Desk took steps to reduce further the price impact of its operations by narrowing the maturity range of issues considered on any one operation. This step was intended to limit the number of issues and propositions that would have to be weighed in the selection process. The total value of purchases made on each tranche was reduced accordingly. This modification permitted faster turn-around times, which is a factor in the competitiveness of the propositions the Desk receives, and also helped to reduce further any impact of the Desk's operations on market prices. At the same time, in the announcement messages sent to the dealers, the Desk began to specify those issues within the maturity range it would not purchase because of portfolio considerations. Specifying these issues in the announcements simplified the submission and selection process further for the Desk's counterparties.

For the first time, the Desk limited one of the tranches, arranged in November, to Treasury inflation-indexed securities (TIIS). The Desk judged that the different asset characteristics and market trading dynamics of TIIS warranted separation from the operations in nominal coupon issues. Previously, the Desk had considered for the specified maturity range of a tranche propositions on TIIS and nominal coupon issues together, and it had purchased \$100 million of inflation-indexed securities in one operation in 1997.

Chart 4

**SYSTEM OUTRIGHT OPERATIONS BY TYPE**



But the Desk had found that it was difficult to make relative value judgements between inflation-indexed and nominal coupon issues during the selection process of an operation.

*Other Activity Affecting the Size of the SOMA Portfolio*

In addition to its market purchases, the Desk bought \$3.6 billion of bills directly from foreign accounts, and \$2 billion of bills were redeemed early in the year. A portion of maturing original issue seven-year notes held in the SOMA portfolio also was redeemed. The Desk held \$4.3 billion of such notes that matured during the year, all on dates when new Treasury inflation-indexed securities settled, and that portion of maturing notes that exceeded the amount of TIIS that the Desk wished to purchase was redeemed. Altogether, the Desk exchanged \$1.6 billion of the maturing notes for TIIS, equal in value to 5 percent of the amount issued to the public, while the remaining \$2.7 billion of the maturing seven-year

Table 3

## Weighted Average Maturity of Marketable Treasury Debt

(in months)

Year-end	SOMA Holdings	Total Outstanding Debt
1960	19	55
1965	16	60
1970	24	40
1975	31	33
1980	55	48
1985	49	59
1990	41	68
1991	31	68
1992	36	67
1993	38	65
1994	38	66
1995	39	63
1996	41	63
1997	43	65
1998	47	68

Notes: The effects of all outstanding temporary transactions on SOMA holdings are excluded from the calculation. The maturity of total outstanding Treasury debt for 1998 is as of the end of the fiscal year.

notes were redeemed. With the exception of these maturing seven-year notes, all maturing Treasury coupon securities were exchanged for new notes that were issued on the corresponding maturity date. On each such date when more than one auction settled, the distribution of newly acquired issues by maturity was proportional to the amounts the Treasury was issuing to the public.

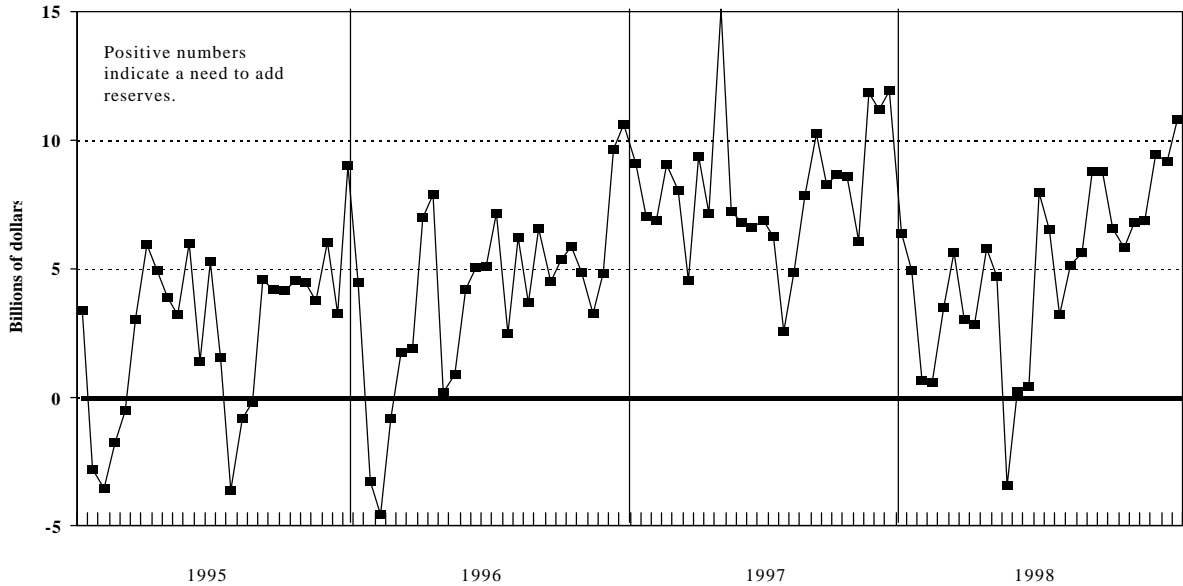
About \$300 million of federal agency securities were redeemed in 1998 as part of the SOMA's ongoing redemption of agency securities. The Desk also sold \$25 million of agency debt back to the original issuer as part of that agency's program to retire or replace a portion of its outstanding debt. At the end of the year, SOMA agency holdings had fallen to just over \$300 million.

### *SOMA Portfolio Management*

As in 1997, the overall expansion of the portfolio was heavily concentrated in holdings of Treasury coupon securities. The relative reduction of bills held in the portfolio increased the average maturity of all Treasury issues in the SOMA, which at the end of the year stood at 47 months compared with 43 months at the end of 1997 (Table 3). At the end of the year, 14 percent of the volume of all outstanding marketable Treasury debt was held in the SOMA portfolio, up a bit from 13 percent one year earlier. The percentage of the volume of all outstanding bills that was held in the portfolio increased to 31 percent at the end of 1998 from about 30 percent, reflecting the decline in the volume of bills outstanding. Just above 9 percent of the total outstanding volume of coupon issues, including TIPS, was held in the portfolio at the end of the year, about 1 percentage point more than one year earlier.

Chart 5

**OPEN MARKET OPERATIONS NEEDED TO HIT PATH**  
estimates at the start of each maintenance period



**III. TEMPORARY ACTIVITY FOR THE SYSTEM OPEN MARKET ACCOUNT**

**Determinants of the Size and Structure of Temporary Open Market Operations**

*Period Average Reserve Needs and Revisions*

The size of the reserve imbalances estimated at the outset of each two-week maintenance period, after incorporating the effects of any outright operations arranged previously, measures the need for temporary open market operations. In 1998, the sizes of these initially estimated period needs, in absolute value to allow for temporary reserve surpluses, averaged \$5.3 billion, down from \$8.0 billion in 1997 (Chart 5).<sup>9</sup>

The decline in the average was partly the byproduct of the higher volume of outright purchases made in 1997, which left smaller reserve imbalances early in 1998 than had existed early in the previous year. The period-average reserve surplus that was estimated at the start of the May 20 period was the unanticipated outcome of the Desk's reserve management strategy for the April tax season, discussed in the insert below. Revisions to factors affecting reserve supply or demand during a period affect the actual size of temporary operations needed during that maintenance period, and the Desk must allow for the possibility of such revisions in structuring its operations as it goes through a period. Net revisions to factors affecting the supply of reserve balances over an entire period tended to be less in 1998 than in other recent years, largely reflecting smaller Treasury balance revisions (Table 4). At the same time, revisions to key determinants of the demand for balances at the Federal Reserve—required reserves and applied vault cash—were virtually

<sup>9</sup> These initial estimated reserve needs are also reduced by any temporary term RPs arranged in an earlier maintenance period that extend into the indicated period.

Table 4

**Revisions to Estimates of Open Market Operations Needed to Hit Path  
average absolute revisions to initial estimates of maintenance period average values  
(millions of dollars)**

	1997	1998
<b>Factors Affecting Supply of Reserve Balances</b>		
Treasury Balance	1002	506
Currency in circulation	361	500
Foreign RP Pool	500	381
Float	227	312
Net Factor Revision*	1413	1034
<b>Factors Affecting Demand for Reserve Balances**</b>		
Required Reserves		
Before LRA	443	353
After LRA	--	22
Applied Vault Cash		
Before LRA	231	316
After LRA	--	12
Required Reserves-Applied Vault Cash		
Before LRA	352	182
After LRA	--	25

Note: Projection errors are based on New York staff estimates.

\* Includes revisions to as-of adjustments and required clearing balances which do not affect reserve balance supplies but affect the demand for reserve balances

\*\* All revisions in 1997 were before LRA; revisions in 1998 through the period ending July 29 were before LRA.

eliminated with the advent of LRA in August.<sup>10</sup> Before the introduction of LRA, sizable revisions to required reserves and applied vault cash sometimes were made relatively late in a period. Because any revisions from these sources affected the reserve estimates for the entire two-week period, and not just for the day the revision was made, the Desk viewed its estimates of required reserves and applied vault cash as major sources of uncertainty in the projections which had to be taken into account when structuring its operations late in a period.

*Daily Volatility and Projection Errors of Reserve Supply and Demand*

The decline in required operating balances has increased banks' exposure to overdrafts arising from unanticipated shifts in their daily reserve positions. As a result, both the day-to-day swings in factors affecting the supply of reserve balances and the potential for error in the projections of these factors have

<sup>10</sup> Revisions to the estimates of the demand for excess reserves were not formally calculated because there are no data on actual demands. A crude measure, which assumes that all excess reserves were desired, is the absolute difference between the initial path allowance for excess reserves and actual period average excess reserves. This difference averaged \$252 million in 1998 and \$294 million in 1997.

Table 5

## Daily Changes and Forecast Errors in Key Determinants of Reserve Balance Supply

average and maximum of absolute values

(millions of dollars)

	1995		1996		1997		1998	
	average	max.	average	max.	average	max.	average	max.
<b>Daily Changes</b>								
Treasury balance	1,233	12,639	1,002	9,780	1,484	17,393	1,413	22,571
Currency in circulation	655	1,582	646	2,016	679	2,474	709	2,788
Foreign RP Pool	486	3,955	369	3,017	542	6,989	500	6,193
Float	515	3,748	790	8,154	548	4,605	791	5,449
Net value	1,491	11,470	1,413	11,787	1,896	18,366	1,751	23,727
<b>Daily Forecast Error</b>								
Treasury balance	642	4,188	732	4,921	726	5,969	620	3,407
Currency in circulation	206	932	213	932	200	980	217	999
Foreign RP Pool	124	617	113	617	203	1,433	150	935
Float	284	1,903	371	3,768	312	3,433	383	2,386
Net value	743	4,139	898	5,042	848	5,991	744	3,664

Note: Projection errors are based on New York staff estimates.

taken on a greater role in the Desk's daily reserve management deliberations.<sup>11</sup> For this same reason, the day-to-day volatility in the demand for excess reserves and the potential for error in the judgement of daily excess demand have also become more important considerations in the Desk's management of reserves.<sup>12</sup>

Recent experience with daily changes and forecast errors of key determinants of the supply of balances at the Federal Reserve--the Treasury balance at the Fed, Federal Reserve float, currency in circulation, and the foreign RP pool--is summarized in Table 5. The average daily net change in reserve balances arising from movements in the four factors listed in Table 5 approached \$2 billion in both 1997 and 1998, highlighting the importance of our temporary operations for smoothing out daily reserve patterns. To some degree, the average was driven by outliers, which topped out at around \$20 billion in each of the past two years, illustrating the potential for huge swings. The biggest swings tended to be associated with movements in the Treasury balance around key tax dates. Average daily forecast errors, while smaller than typical daily movements, underscore the risks in managing reserve supply. The average daily net forecast error for the sum of these same four factors in 1998 was around \$750 million, somewhat less than in the preceding two

<sup>11</sup> The reserve supply projections presented in this section are those of the New York staff. In making reserve management decisions, the Desk also uses estimates made by the Board for all factors and by the Treasury for the Treasury balance. Differences between staff estimates help the Desk appreciate the risks inherent in these daily estimates.

<sup>12</sup> Mis-estimation of the demand for reserve balances and the supply do not pose symmetrical risks for the funds market because the impact on the rate of an imbalance between demand and supply will depend partly on the absolute level of supply. With a low supply of balances, any associated overdraft positions among banks must be covered, which will place upward pressure on the funds rate until either the available supply of reserves is redistributed to allow all banks to cover their overdrafts or overdrawn banks choose to borrow at the discount window. If the level of balances is high, even if the demand for balances is higher, the associated risk of overdrafts is lessened.



years but still of the same general order of magnitude. The largest daily miss in 1998 was \$3 1/2 billion. The Treasury balance regularly is the single most difficult factor to estimate, and it, along with float, were the sources of the biggest daily errors.

Comparable measures of changes in the actual demand for excess reserves consistent with the funds rate at target and of errors in the daily estimation of excess demand are not available. Some insight into important determinants of the daily intraday pattern to the demand for excess reserves is provided in the later discussion of excess reserves.

### **Temporary Open Market Operations Arranged in 1998**

#### *The Selection of Temporary Open Market Operations*

The Desk typically relies on a mix of term and overnight RPs to meet the reserve shortages that characterize most maintenance periods (Chart 6).<sup>13</sup> In 1998, with operating balances remaining low, the Desk continued to use overnight RPs extensively to address reserve shortages in view of the daily volatility of reserve factors and excess reserve demand and potential projection errors. For these same reasons, a term RP rarely was intended to address all the reserve shortages estimated for the days spanned by the RP beyond the initial date, and frequently an overnight operation was arranged even on the same day a term operation was put in place. Term RPs were usually designed to leave reserve shortages of at least moderate size in subsequent days to be addressed with additional RPs. This approach allowed the Desk to tailor the total amount of all RPs outstanding on any day to fit with the most up-to-date reserve estimates.

The frequency with which term RPs were arranged was down a bit from 1997, partly reflecting the smaller shortages that characterized 1998. Three fixed-term operations with maturities ranging from 30 to 45 days were arranged in December, utilizing the Desk's new authority for long-term RPs, to address a portion of the year-end reserve shortages which were expected to recede significantly in January 1999. These term RPs were among the few such RPs that were set to mature in a maintenance period beyond the one in which they were arranged.

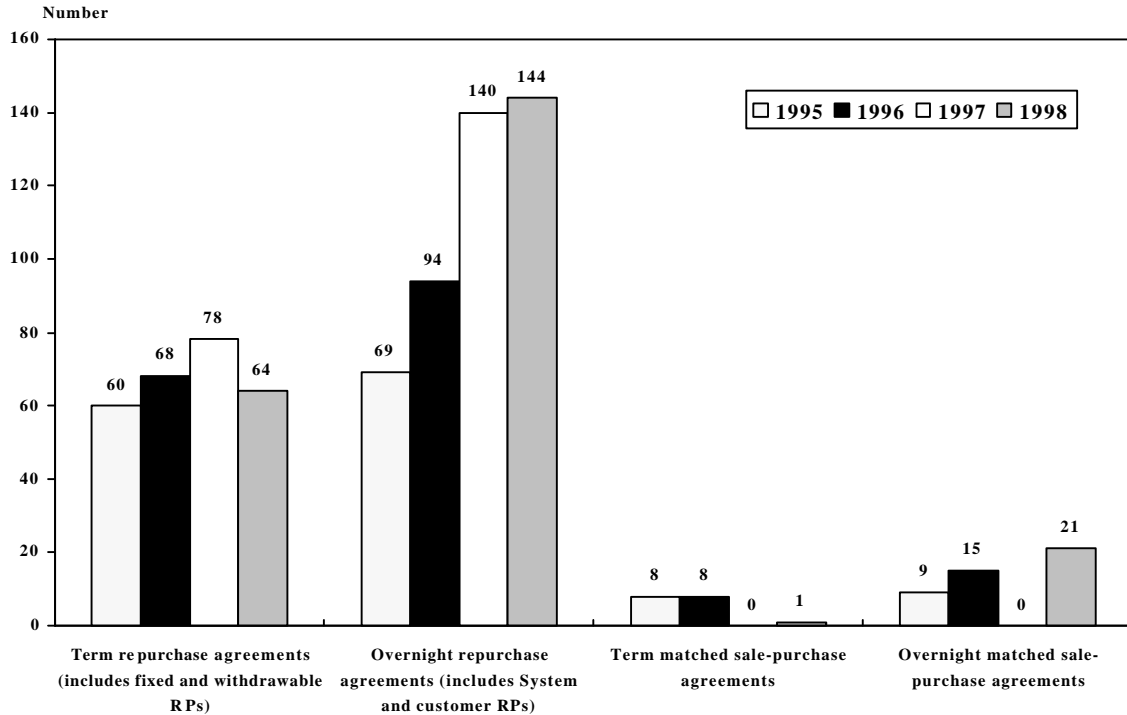
The Desk used matched sale-purchase agreements (MSPs) in 1998 for the first time since May 1996. The first two of these operations fell in the January 14 period, when huge upward revisions to weather-related float came after term RPs had been put in place to address what were expected to be reserve shortages. Most of the MSPs were arranged in May after significant revisions to estimates of the impact of the April-May tax season on tax flows reversed earlier projections of potentially huge reserve shortages, as described in the insert. All but one of the MSPs arranged in 1998 were for a single business day.

---

<sup>13</sup> The expression "overnight" is used to denote any operation that matures the next business day.

Chart 6

**SYSTEM TEMPORARY OPERATIONS BY TYPE**

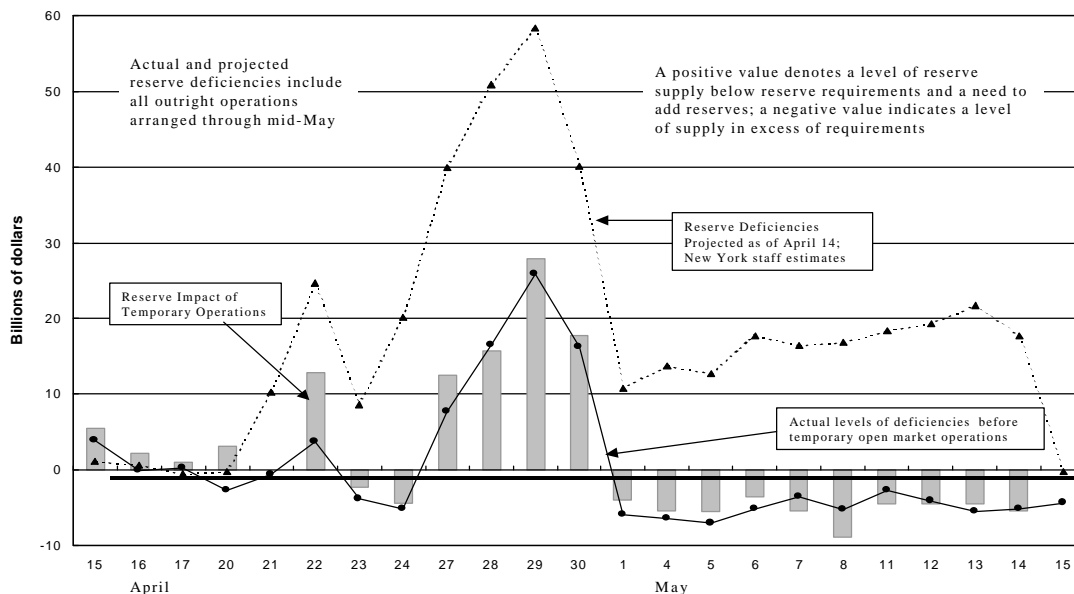


*Technique of Intervention*

The Desk retained its practice of normally arranging temporary open market operations no more than once a day, shortly after 10:30 a.m. when a complete set of reserve estimates was first available. For the new long-term RPs that were arranged in 1998, a somewhat different practice was adopted. These operations were arranged earlier in the day, around 8:30 a.m. These RPs were not necessarily intended to meet all of the reserve shortage estimated for the day on which they were arranged, so there was no need to await a complete set of reserve estimates. The Desk also wanted to take advantage of a more liquid market that an earlier entry time would offer. For the three long-term operations arranged in 1998, propositions were strong--measured in total volume and in rates offered relative to current market quotes--perhaps because dealers were attracted by the prospect of securing financing over what they believed might be a potentially difficult year-end.

The Desk always was prepared to depart from its usual practices as circumstances warranted. It entered the market ahead of the usual intervention time on numerous occasions apart from the three long-term RPs. These early entries were motivated either by a view that the expected reserve shortage on the day required taking advantage of the greater market liquidity that exists earlier in the morning, or by a feeling that firm financing pressures that existed at the time needed to be addressed promptly. Sometimes these early entries were followed up with more operations at the usual market intervention time.

**Reserve Deficiencies (reserve requirements less reserve supply) and Temporary Open Market Operations in April and May**



**THE MANAGEMENT OF RESERVES AROUND THE APRIL 15 TAX SEASON**

The Desk's reserve management strategy around the April 15 tax date reflected its experience in April-May 1997. Tax receipts in April-May 1997 far exceeded projected inflows, and the resulting reserve shortages that the Desk had to address with temporary operations were unprecedented. Tax receipts in April-May of 1998 were expected to exceed their level of the previous year, and the Treasury's balance at the Fed was expected to surge again, even though the Treasury had arranged to have \$64 billion in cash management bills mature in mid-April (\$14 billion more than in 1997) in order to control the build-up in its general cash position.

To prepare for the expected surge in Treasury receipts, the Desk purchased \$13.2 billion of securities outright in March and April, much more than it had acquired during this time the previous year, to limit the reserve shortages that would have to be addressed with RPs. Even so, sizable RPs were still expected to be needed through mid-May to meet reserve shortages that, according to the highest estimates, were expected to peak at nearly \$60 billion in late April. Only after the planned outright operations were completed did it become evident that reserve deficiencies would be significantly less than initially anticipated. To a large degree, this projection error reflected the success that the Treasury had in promoting participation in its Treasury Tax & Loan (TT&L) program after it broadened the types of collateral it accepted for this purpose. TT&L capacity was over \$15 billion higher than anticipated, which reduced the cash balance that had to be held in the Fed account by a similar amount once the Treasury's total cash position exceeded the

holding capacity at private banks. At the same time, total corporate and individual taxes fell about \$20 billion short of the high end of the set of estimates.

After making its outright purchases in April, the Desk unexpectedly found itself having to drain reserves as a result of the higher TT&L capacity and Treasury's lower total cash position. Large RPs were still needed to add reserves in late April when the Treasury balance at the Fed was at its peak. But for a few days prior to the cash build-up, and again starting at the very end of the month when large government outlays and paydowns brought Treasury's cash position back down, matched sale-purchase agreements were used to drain reserve surpluses.

The federal funds rate traded with a soft tone through much of this period. This condition partly reflected some tentativeness on the Desk's part in addressing the unexpected reserve surpluses while the possibility for large under estimation of the Treasury's balance still remained. In addition, the sudden shift in financing patterns brought on by the concentration of TT&L balances at a relatively small number of institutions that are typically major buyers of funds shaped market perceptions about the availability of reserves in the interbank market.

#### **IV. EXCESS RESERVES AND THE FEDERAL FUNDS RATE**

##### **Excess Reserve Levels**

###### *Period average excess reserves*

The uptrend in period-average levels of excess reserves that became evident in 1997, which was discussed in last year's report *Open Market Operations During 1997* and which has been associated with the decline in required operating balances, intensified in 1998.<sup>14</sup> But whereas the increase in the preceding year was observed broadly across different classes of institutions, in 1998 the increase in the underlying demand for excess reserves occurred away from large banks and was concentrated among other institutions, notably small commercial banks and thrift institutions (Chart 7).<sup>15</sup>

The link between excess reserve levels and required operating balances at small commercial banks and thrifts is more clearly seen in Chart 8, where excess and required operating balances are presented and their

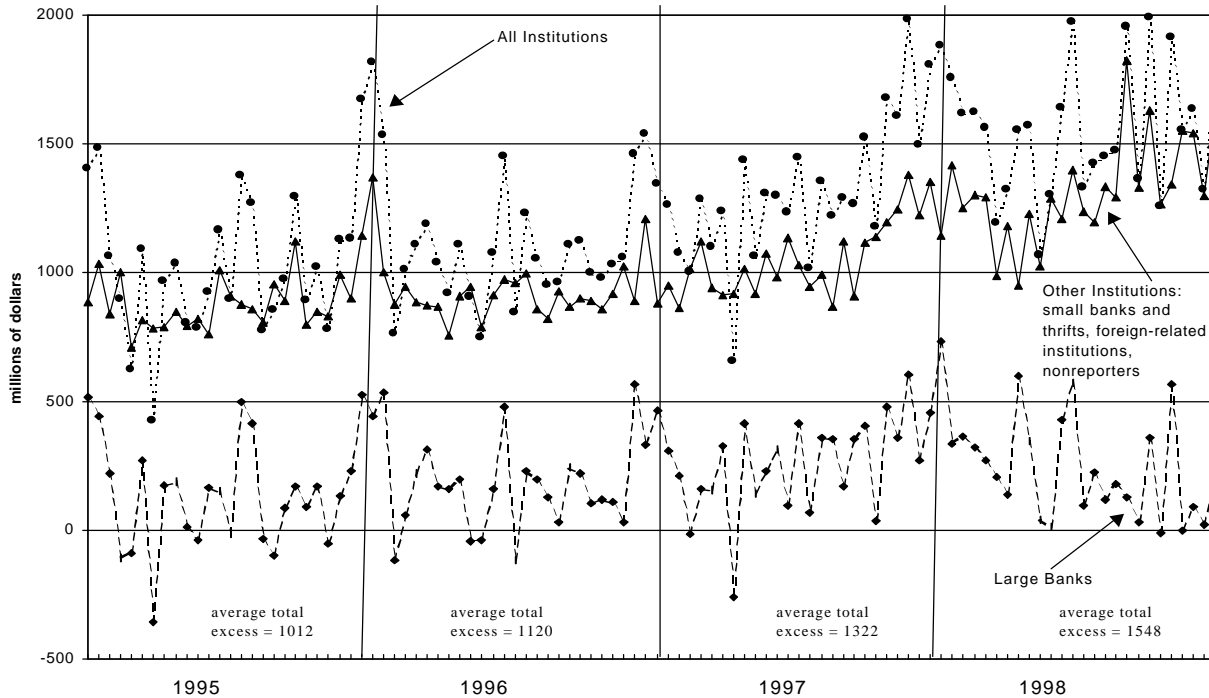
---

<sup>14</sup> The Desk attempts to meet banks' demand for excess reserves both for every maintenance period and for each day in a period. For this reason, absent a true measure of excess demand, average values for actual levels of excess reserves can be taken as an approximation of demand, notwithstanding the surprises to reserve supply and misjudgments the Desk may make about demand which can cause actual excess levels to diverge from true demands.

<sup>15</sup> The "large" bank category for which the Desk collects reserve information includes about 130 of the largest banks and thrifts. The Desk also collects reserve information separately for small commercial banks, small thrift institutions, foreign-related institutions, and nonreporting banks: these four categories are sometimes aggregated into a grouping labeled "other institutions" in this report.

Chart 7

**EXCESS RESERVE HOLDINGS BY BANK CATEGORY**  
maintenance period averages



changes are scaled equally.<sup>16</sup> From 1995 to the middle of 1997, the period of greatest decline in required operating balances, only a small fraction of the drop in required operating balances was reflected in higher excess levels at these institutions. From the middle of 1997 through 1998, even though the pace of decline in required operating balances slowed, at the margin the further decline had a greater impact on excess reserve levels. The recent patterns suggest that a point of diminishing returns on the expansion of sweeps has been reached for these institutions in the aggregate as more of each decline in required balances seems just to raise excess reserve levels.

The link between excess reserves and required operating balances among large banks as a group was less clear in 1998. The pace of decline in required operating balances at these banks also slowed around the middle of 1997. But while operating balances have fallen a bit since then, the average level of excess reserves at these banks was unchanged on balance in 1998 after having risen in 1997 (Chart 9).<sup>17</sup>

The manner in which the Desk has incorporated the trend to higher excess reserve levels into its own projections of excess reserve demand has reflected the ways in which lower levels of required operating

<sup>16</sup> The measures of excess reserves and required operating balances in this and other charts in this report are drawn from internal data sources that only reflect revisions to the data made within the first five weeks after a maintenance period has ended.

<sup>17</sup> In Chart 9, the scale for changes in required operating balances is half that for excess reserves because the huge decline in requirements over this period overwhelms in scale movements in excess levels.

Chart 8

**REQUIRED OPERATING BALANCES AND EXCESS RESERVES AT SMALL BANKS, THRIFTS, AND NONREPORTERS**  
maintenance period averages

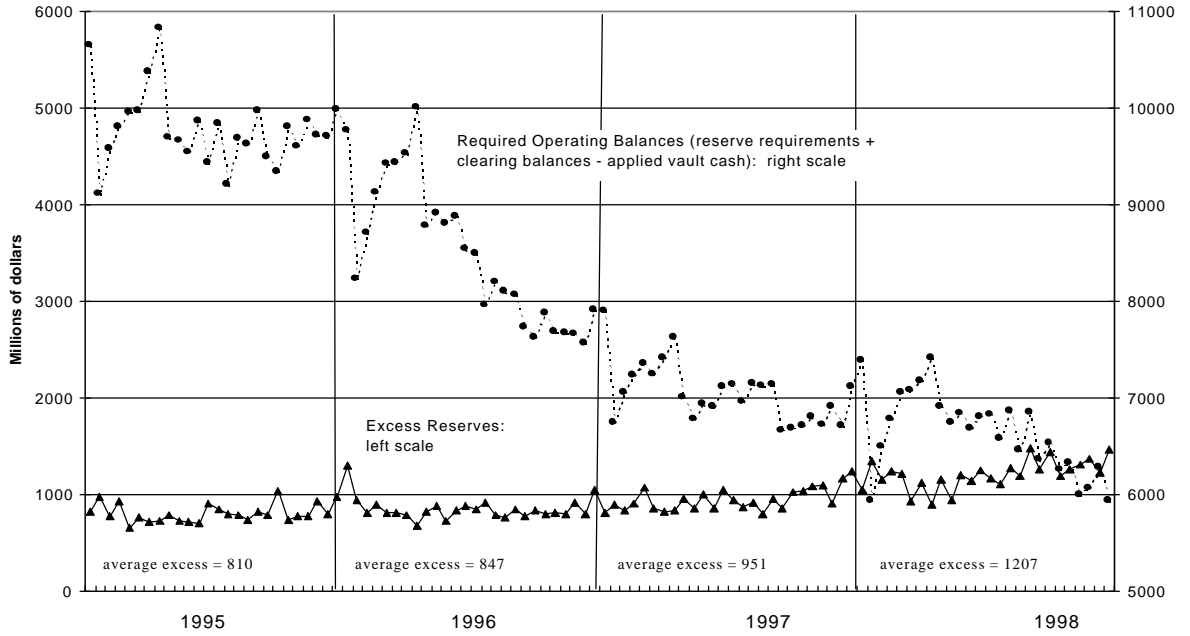
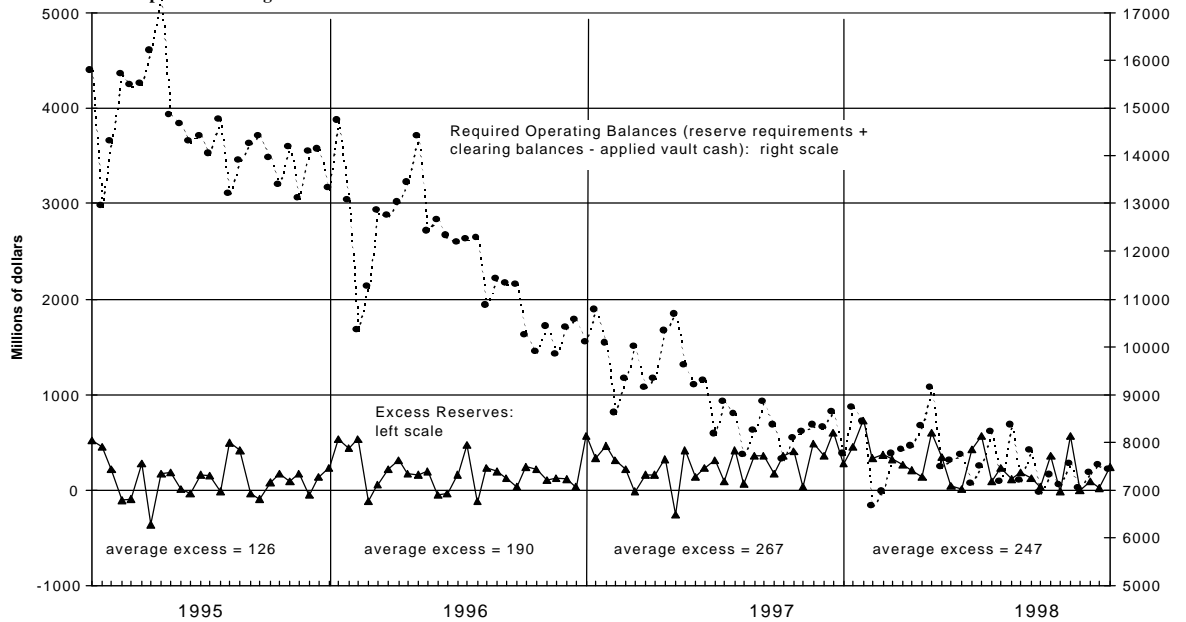


Chart 9

**REQUIRED OPERATING BALANCES AND EXCESS RESERVES AT LARGE BANKS**  
maintenance period averages



balances have translated into higher excess levels. Some banks working with lower required operating balances have chosen consistently to hold a higher level of excess reserves at the end of each day as a precaution to guard against unexpected contingencies that could reduce their reserve balances and send them into overdraft. This kind of behavior may be broadly descriptive of some institutions that have limited access to funding markets, especially smaller entities.

However, among larger banks and even some smaller institutions that have the ability to adjust their reserve balance position throughout most of the day by trading in the brokered funds market or directly with other banks, higher excess reserve levels have been the byproduct mostly of unanticipated late-day payment inflows. The high excess levels individual banks have been left with on some days as a result have been harder to offset fully with negative excess positions on remaining days within the same maintenance period because required operating balances have been so low. That is, banks in general have been more prone to becoming “locked in” inadvertently to holding an undesirably high level of excess reserves under low required operating balances.

In making its allowance for excess reserve demand in a maintenance period, the Desk allows for elevated precautionary demands as these have come to be recognized over time, and it takes stock of any lock-ins that arise as a maintenance period progresses. But the Desk does not provide higher excess reserve levels as it goes through a period in anticipation of undesired lock-ins that have not yet arisen, even if these are now seen as more likely to develop at some point. Doing so would risk leaving banks holding undesired reserve surpluses at the end of the period if they succeed in avoiding lock-ins, or could risk exacerbating the conditions that could give rise to lock-ins if too many reserves are left in place on any day.<sup>18</sup>

In recognition of recent trends, in 1998 the allowances the Desk made at the start of each maintenance period for period-average excess demand rose from about \$1 billion, a level which had prevailed for many years, to levels that often were close to \$1 1/2 billion. However, in the current environment the Desk has had to treat any initial allowance very flexibly, making more frequent informal modifications as a period unfolded in response to actual patterns of excess holdings and the observed behavior of the funds rate. To aid in its judgment, the Desk used daily reports of excess holdings at small and large institutions to evaluate their levels of demand, and it utilized daily reports containing reserve information for about twenty-five

---

<sup>18</sup> A possible exception to this approach concerns planning for days of high payment flows. Because of the size and uncertainty of position swings on these days, the likelihood that an institution may unexpectedly find itself holding a reserve deficiency at the end of the day is greatly increased. In the presence of heightened rate pressures typically evident in the morning and to guard against such a distribution of reserves from aggravating these pressures, the Desk usually provides for elevated levels of excess reserves on these days. The higher excess levels planned for these days may be reflected in the Desk’s estimates of excess reserves for the entire period if the Desk judges that banks would not be able to work off all of their elevated excess positions accumulated on the high payment flow dates. The allowance for excess incorporated in the path may not be adjusted formally, although the Desk’s decisions about operations will reflect the revised estimates for excess. In effect, the possibility for lock-ins in this situation is to some degree

individual large banks to determine when any of these banks became locked into holding excess reserves in a maintenance period.

#### *Daily patterns of excess reserves*

The preference for concentrating reserve balance holdings late in a maintenance period that banks have shown for years was again evident in 1998 (Chart 10). This skewed pattern was most pronounced at large banks, where cumulative or average excess positions were usually negative throughout the period until the final day, but it is a general feature for most categories of banks.

In 1998, the Desk provided even higher levels of excess reserves than it had in previous years on days when payment flows were heaviest and most unpredictable (Chart 11). These days include the first and last business day of each month, tax dates, and major Treasury auction settlement dates.<sup>19</sup> Most, but not all, of the increase in excess reserves provided wound up at larger banks. In providing even higher levels of excess reserves on high payment flow days, the Desk looked for other occasions within the same maintenance period to leave fewer excess reserves, consistent with banks' period average demands, with the attendant risk that unexpected reserve shortfalls on those days could leave the actual level of operating balances precariously low.<sup>20</sup>

#### *Excess Reserve Developments in October – December*

The trends noted above both for higher period-average excess levels and for elevated levels on high payment flow days were reinforced late in the year by the Desk's reaction to recurring bouts of rate firmness that emerged in overnight funding markets. The background for these pressures is described more fully in the following section that reviews the behavior of the federal funds rate late in 1998. The Desk often responded to the upward rate pressure it saw in the morning by elevating the level of excess reserves it provided. These funds market pressures were typically most intense around high payment flow days, so the Desk was particularly careful to leave high operating balances in place on those days. Sometimes suitable opportunities to work off the resulting high excess levels did not present themselves because the funds rate often remained firm even in the presence of the accumulation of excess, so that average excess

---

anticipated by the Desk. Arguably, it is a mis-characterization to describe the higher excess levels provided in this case as reflecting "demand."

<sup>19</sup> In Chart 11, quarter-ends are dropped even though payment flows are extremely heavy on these days. Some typical sellers in the federal funds market choose to severely limit the amount they sell on quarter-end dates for balance sheet reporting purposes. This behavior sometimes had a dramatic impact on the level of excess reserves the Desk left in place on those dates, but the level also changed significantly from quarter-end to quarter-end in response to shifts in these banks' funding positions.

<sup>20</sup> To some degree, the rise in period-average excess levels among smaller institutions noted in 1998 was a byproduct of the increased levels these banks held on high payment flow days. However, excess levels on average were also higher on other days among the smaller institutions. As for the large banks, period average levels of excess were no higher in 1998 than the year before despite the fact that excess levels on high payment flow days were higher.



Chart 10

**Average Levels of Daily Excess Reserves**  
by day in a maintenance period

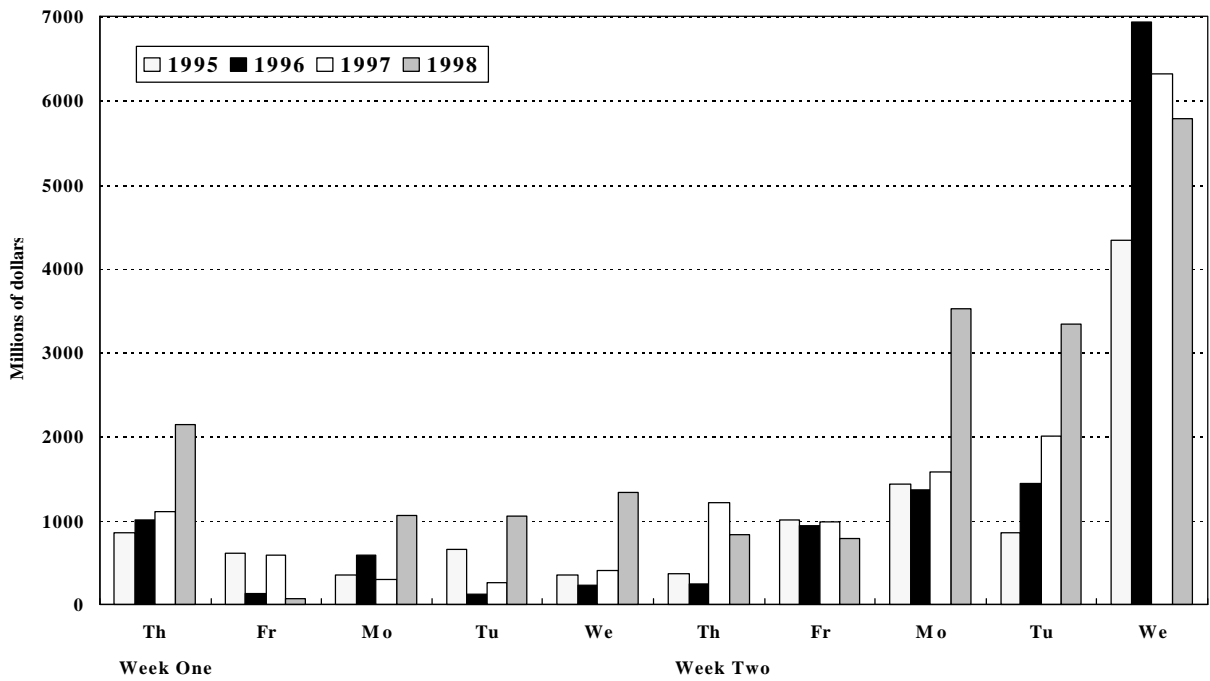
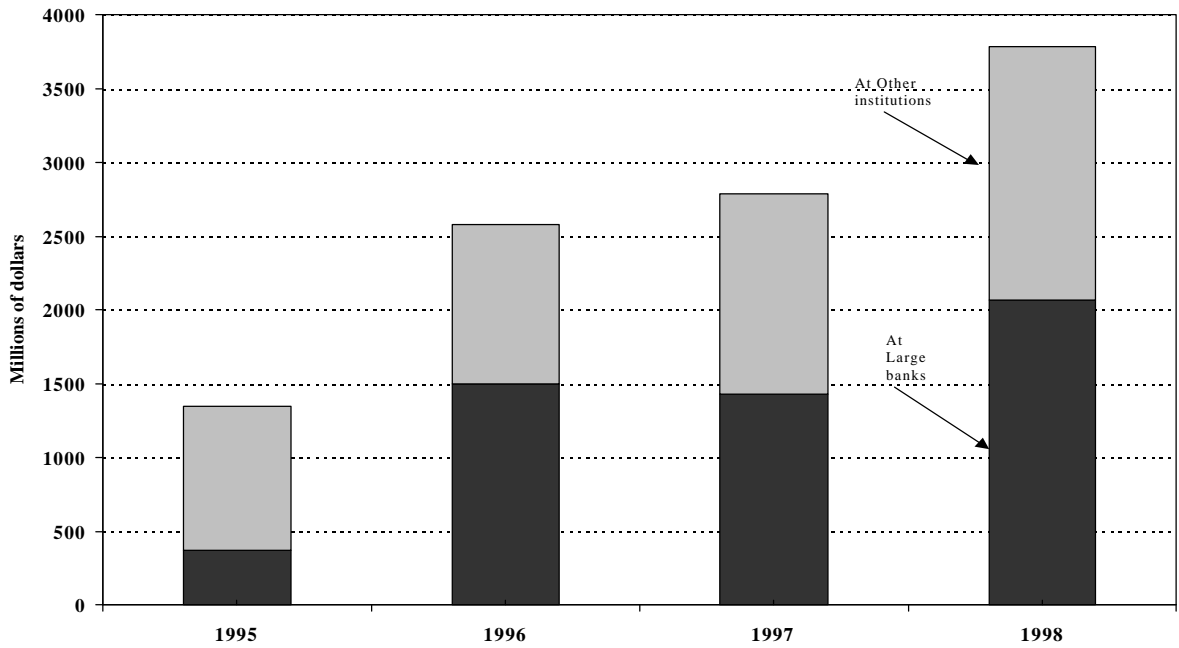


Chart 11

**EXCESS RESERVES ON HIGH PAYMENT FLOW DAYS**

annual averages of the first and last business day of each month (excluding quarter-end dates), major tax dates, and Treasury midquarter refunding settlement dates



levels for some periods in October and November were high as a result. But the trends toward higher excess levels described above were evident even before the final quarter of the year.

### **The Behavior of the Federal Funds Rate**

#### *Daily Deviations and Volatility of the Federal Funds Rate in 1998*

Through the first three quarters of 1998, the daily behavior of the federal funds rate was similar to 1997. Daily behavior is measured by the absolute deviation of the effective (weighted average) rate from target and by the standard deviation around the effective rate of each day's trades. But both deviations from target and intraday standard deviations increased perceptibly during the final quarter of the year when pressures associated with volatility experienced in other financial markets began to affect financing flows and the trading behavior of participants in the federal funds market.<sup>21</sup>

The absolute deviations of the effective funds rate from target and the standard deviations from 1997 and 1998 are plotted for each day in the two panels of Chart 12. In this chart, days characterized by high payment flows and maintenance period settlement days are in red. To facilitate comparisons, for 1997 and 1998, open circles are used for dates through late-September, and filled circles are used to distinguish observations from late-September through year-end. All values have been restricted to fit on a reduced scale in order to provide more detail at the lower values where most observations are concentrated. (The data and methods behind the construction of Chart 12 are further described in Appendix A.)

From January through late September 1998, the median values for both the standard deviations and deviations of the effective rate from target were within 1 basis point of their median values for 1997 (Table 6).<sup>22</sup> This similarity in general behavior of the funds rate came despite the further modest decline in the level of required operating balances in 1998, but volatility by these measures remained above the levels experienced prior to 1996 when the rapid decline in required operating balances first began to have a notable effect on the daily behavior of the funds rate.

By late September, heightened aversion to credit risk and accompanying dislocations in other financial markets began to affect the funding needs and behavior of key participants in the federal funds market. Some banking institutions encountered widening rate spreads or reduced access to term funding, and their demand for overnight funding rose as a result. Lenders in the overnight federal funds and eurodollar markets in some cases cut lines to certain borrowers, adding to instances of dislocation. At the same time,

---

<sup>21</sup> In this report, the persistence of higher daily volatility is dated as beginning on September 29, although its actual emergence was somewhat more gradual.

<sup>22</sup> In making comparisons between different time periods, median values are preferred because of the possible influence of a small number of very large outliers on the calculation of the mean. All calculations are based on business day observations, with no adjustment for the impact of holidays or weekends on the calculation of effective rates averaged over longer time horizons.

Chart 12a

**Absolute Values of Deviations of the Daily Effective Federal Funds Rate from Target and the Standard Deviations of the Daily Effective Funds Rate  
All Business Days in 1997**

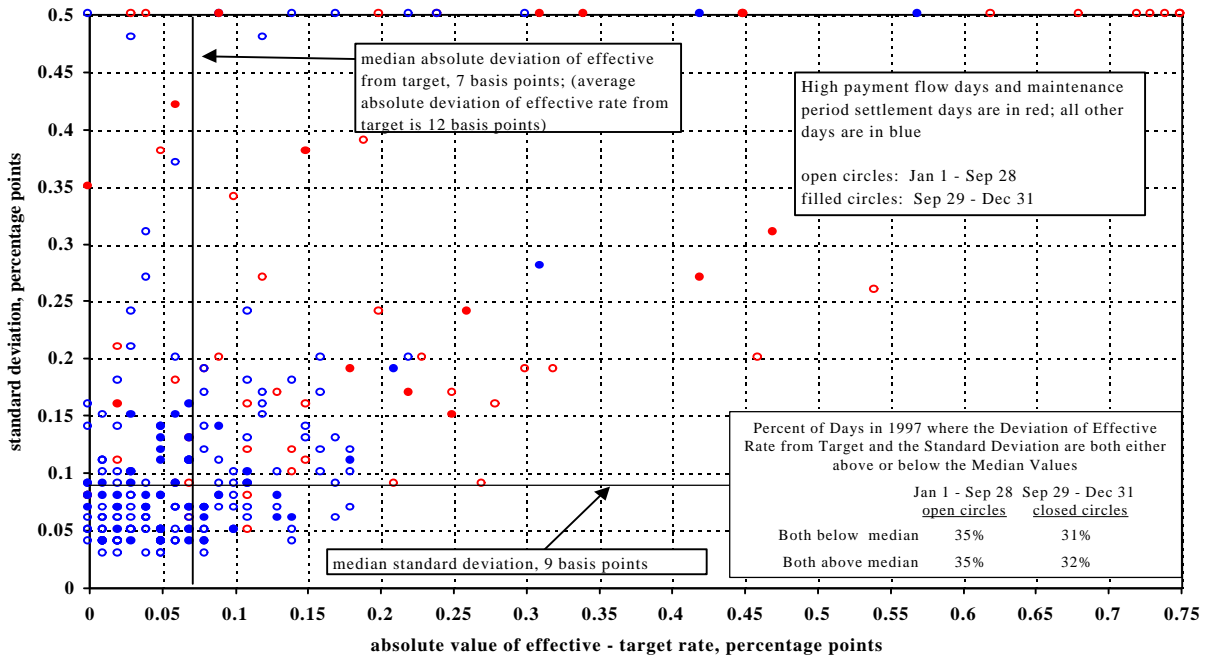
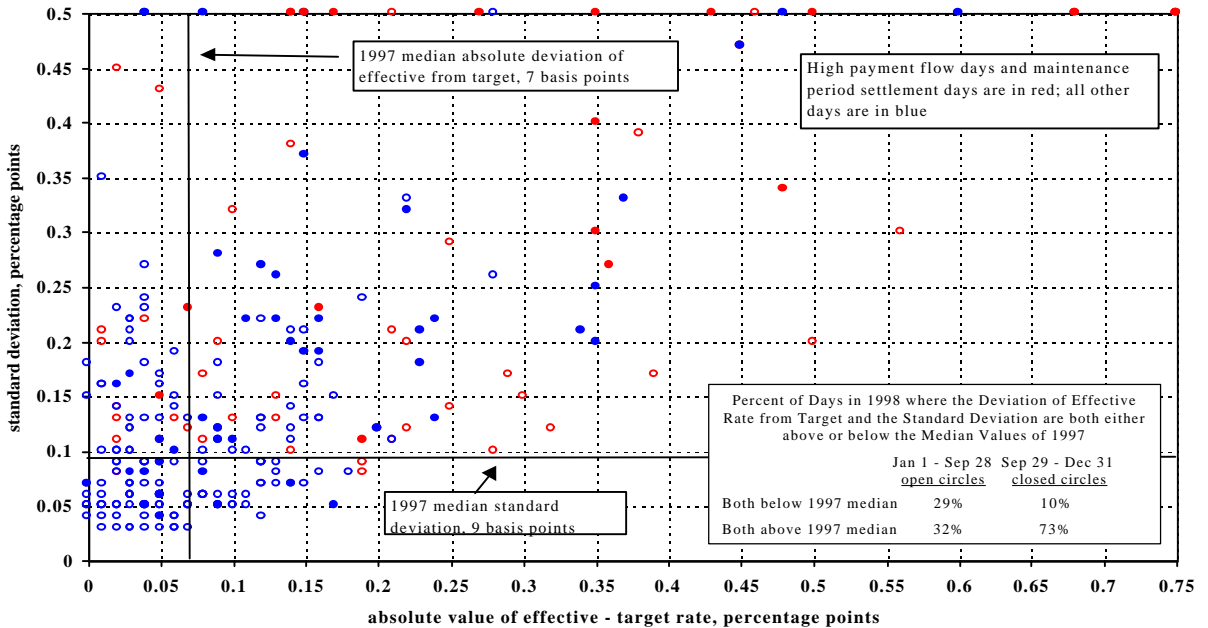


Chart 12b

**Absolute Values of Deviations of the Daily Effective Federal Funds Rate from Target and the Standard Deviations of the Daily Effective Funds Rate  
All Business Days in 1998**



banks' aversion to borrowing at the discount window appears to have intensified out of concern that borrowing might be seen as a sign of poor financial health.

A tiering of rates by institution did not develop, but the intraday trading strategies many market participants adopted often lent a very firm bias to rates in the morning as highly risk averse borrowers bid aggressively for funds early in the day. Their actions sometimes lifted the entire rate structure paid by all borrowers for much of the day, especially as lenders in the market came to recognize this caution. This pattern was most prevalent on days characterized by high payment flows, when uncertainties about daily reserve positions are typically greatest.

The Desk responded to these conditions by providing added levels of liquidity—higher excess reserves—on days when these financing pressures were most evident. This response reinforced the tendency of the funds rate to fall off late in the day when the level of reserve balances left in place proved higher than final demands. The high period-average levels of excess reserves through much of October and November also encouraged very soft conditions in the funds rate on several maintenance period settlement days during this time. The funds market went through several cycles of firmness sustained over several days, often triggered by high payment flow dates, followed by periods of softness.<sup>23</sup> Eventually, the Desk's response and adjustments some regular borrowers in the funds market took to reduce their reliance on overnight financing helped ease these pressures by late November, but they remained a feature of the funds market through the year-end.

The volatile rate environment created by participants' defensive trading strategies and the Desk's response to them was reflected in both larger deviations of the effective daily funds rate from target and higher daily standard deviations. The median value of the daily standard deviations jumped to 22 basis points for late September through December, and the median absolute deviation of the funds rate was 16 basis points, both well above the corresponding levels for all of 1997 and through the first three quarters of 1998 (Table 6).<sup>24</sup> In the final quarter of 1998, both the standard deviation and the deviation of the daily effective from target exceeded their median levels from 1997 on over 70 percent of all days, roughly twice the percent that typically has been above the median on both measures.<sup>25</sup> The degree of volatility observed in

---

<sup>23</sup> Softer rates sometimes emerged after participants began to incorporate expectations, often incorrectly, that the Desk was going out of its way to make generous reserve provisions. On many days when these expectations were not accurate the funds rate nonetheless remained soft as participants at first traded on the expectation or perception of Desk generosity and then as actual levels of excess reserves, even if quite low, still proved sufficient to cover end-of-day needs. Conversely, market expectations or perceptions of low levels of liquidity sometimes kept the funds rate firm throughout most of some days when excess levels were highest.

<sup>24</sup> Historically, the funds rate has tended to be a bit more volatile in the fourth quarter of a year compared to the preceding three quarters. However, median values of the standard deviations and absolute deviations of the effective rate from target in the final quarter were never more than a couple of basis points higher than in the first three quarters in any year from 1995 through 1997.

Table 6

**Deviations of the Daily Effective Federal Funds Rate from Target  
and the Daily Standard Deviation of the Funds Rate**  
(in basis points)

	1997 Entire Year	1998 Jan.1-Sep.28	1998 Sep.29-Dec.31	1998 Entire Year
Median of Standard Deviations	9	10	22	12
Median of Absolute Deviations of the Effective Rate from Target	7	6	16	8
Average of Absolute Deviations of the Effective Rate from Target	12	10	22	13

the daily behavior of the funds rate during the final quarter likely was aggravated by required operating balances which hovered near historic lows. But the immediate cause was the change in participants' behavior and the Desk's response.

*Average Levels of the Federal Funds Rate*

With these pressures on the funds rate late in 1998, the Desk was less successful in maintaining the rate on average around the target. On average, the effective funds rate during the maintenance periods ending October 7 through December 30 averaged about 3 basis points below the target (Chart 13). For all maintenance periods in 1998, the average funds rate was less than 1 basis point above target. The average of the absolute deviations of the period-average effective rate for the maintenance periods in late 1998 more clearly reflected the volatility that emerged late in the year. For the maintenance periods that covered October through December, the absolute deviations of the period-average rates from target averaged 10 basis points. The average absolute deviation from target of the period-average effective funds rate was 6 basis points for all of 1998, up from 4 basis points in 1997 reflecting the developments in late 1998.

*Intraperiod Patterns of the Federal Funds Rate*

Intraperiod patterns of the effective funds rate, measured by the deviation from target averaged separately for each day in a maintenance period, were similar to those in preceding years (Chart 14). For example, soft conditions continued to prevail on many Fridays. The sharpest departure from past patterns appeared on settlement Wednesdays, when the effective rate in 1998 was, on average, below target. However, the low average for settlement days in 1998 to a large degree reflected developments that came late in the year. During the final three months of 1998, the funds rate on settlement Wednesdays averaged 27 basis points below the target level, reinforcing the judgment that the period-average levels of excess reserves at the end

<sup>25</sup> Daily observations plotted in Chart 12 form a discrete rather than a continuous distribution. For this reason, when calculating the percent of days that fell either above or below a median value, observations having values equal to the median are apportioned equally above and below the median.

Chart 13

**Maintenance Period Average Effective Federal Funds Rate versus Target Rate**

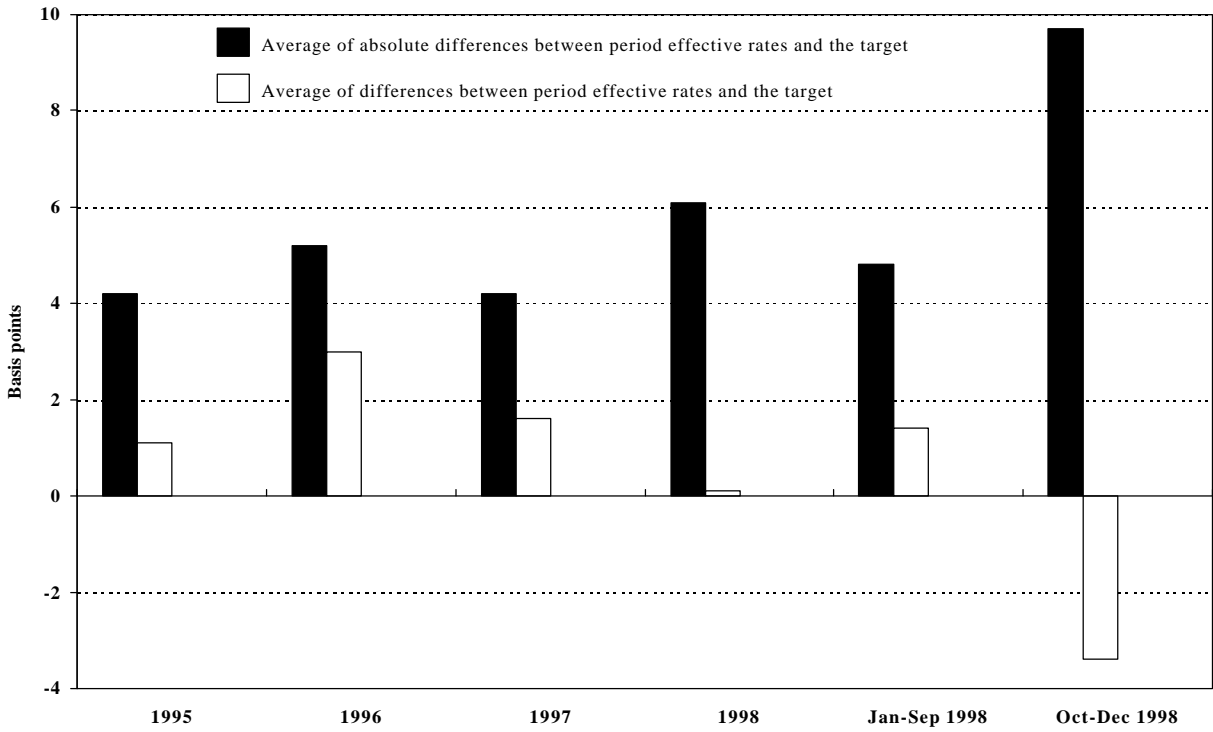
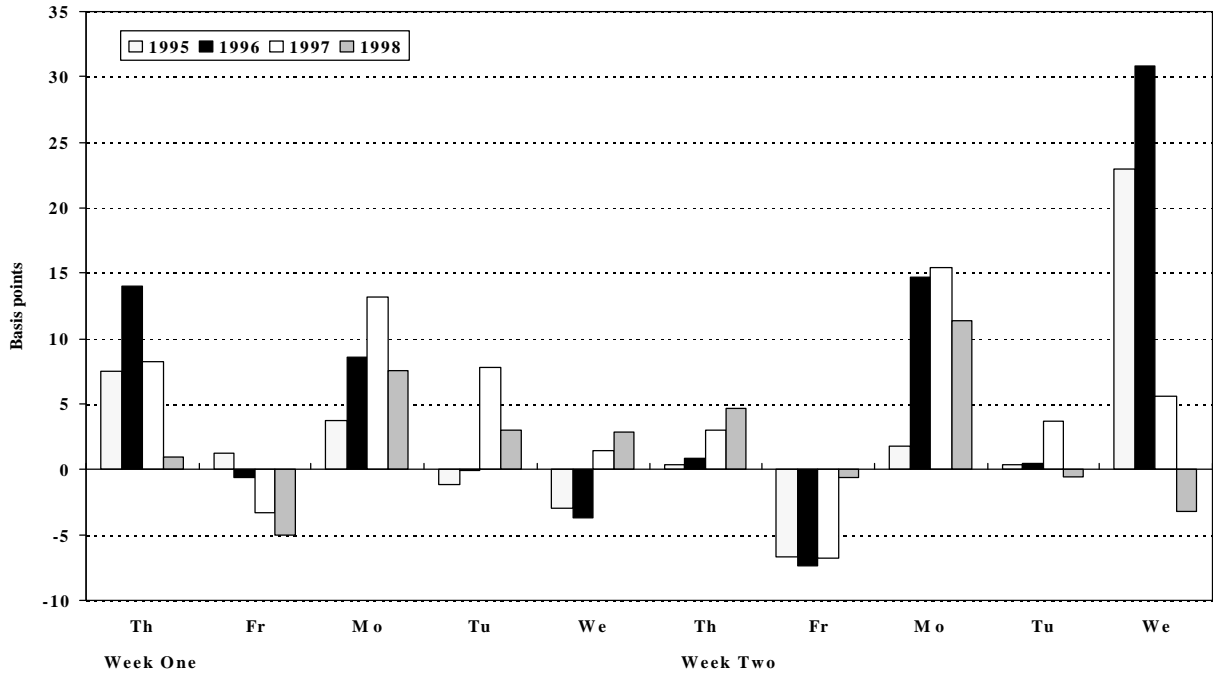


Chart 14

**Average Levels of Daily Effective Federal Funds Rate Less Target Rate by day in a maintenance period**



of these maintenance periods exceeded demands. Over the first three quarters of 1998, the effective rates from these settlement days averaged 6 basis points above target, similar to their average deviation in 1997.

## **APPENDIX A**



## **APPENDIX A: DAILY MEASURES OF THE FEDERAL FUNDS RATE**

Daily trading activity in the federal funds market is represented by two statistical measures—the deviation of the weighted average rate at which trades were arranged relative to the rate specified in FOMC directives, and by the standard deviation of these trades around their average level. The deviation of the effective rate from target often is measured in absolute value. Data needed to make these calculations are compiled each morning by the Desk from a broad sample of brokers who arrange trades between participants in the federal funds market.

Each of these statistics captures somewhat different aspects of the behavior of the funds market. For example, the deviation of the daily effective rate from target is often strongly influenced by participants' expectations about whether reserve supply will prove to be either too scarce or plentiful on any day. Such expectations often establish the rate at which trades will be arranged through most of the day, and may be formed largely on the basis of past experience. The daily standard deviation reflects shifts in these expectations during the day, and it is influenced, as is the effective rate, by actual reserve conditions as they become recognized in late-day trading. Each of these measures of daily activity in the funds market may behave very differently from measures of the funds rate that are averaged over longer time periods, such as maintenance period average rates. By comparing distributions of these two daily statistics from different periods of time, changes in underlying reserve conditions and the behavior of market participants can be examined.

The joint distribution of the daily observations for the absolute deviation of the effective funds rate from target and standard deviation are plotted separately for 1995 and 1996 in the two panels of Chart A1. This chart is constructed in parallel fashion to Chart 12 in the text. High payment flow days--which include the first and last business day of each month, midquarter refunding dates, and major tax dates--and maintenance period settlement days are in red, and all other days are in blue. The scale has been restricted to increase the detail around the lower values where most observations are concentrated; observations with values that exceed this scale are plotted along the outer edges of the chart. (Observations from days that share the same values along both axes are not distinguishable from one another.)

The two panels for 1995 and 1996 illustrate the influence that the drop in required operating balances began to have on the behavior of the funds rate in 1996. In general, the distribution of observations became more scattered in 1996, reflecting the increased volatility in trading conditions that year. The median value for daily standard deviations increased to 10 basis points from 5 basis points, while the median value of daily deviations of the effective rate from target rose from 5 to 8 basis points. The data from later years shown in the text indicate at most a small retracement in underlying volatility since 1996, although this has occurred against the background of further declines in required operating balances. Some general features for all years also are evident in Chart A1. There is, not surprisingly, some tendency for days of high intraday rate

volatility to be positively correlated with big deviations of the effective rate from target. If these two measures were independent, observations would be distributed equally across the four quadrants formed by the intersection of the two lines perpendicular to each axis at its median value.

Some additional information can be gained by plotting the deviations of each day's effective funds rate from target instead of their absolute values (Chart A2). In general, the four panels of this chart show the same phenomenon as the earlier charts—the more volatile conditions that exist on high payment flow days, the increase in volatility that emerged in 1996, and the more volatile trading conditions that characterized the final quarter of 1998. Median values for the deviation of the effective rate around target are not shown because they are very close to zero, and by themselves give no indication as to the underlying distribution between soft and firm days in the funds market which tend to cancel one another out. This is most striking in the final quarter of 1998—the solid dots plotted in that year's panel—when deviations of the daily effective from target became elevated, but alternated between firm and soft days so that their average and median levels were close to zero.

Data from 1998 are replotted using an unrestricted scale in Chart A3, with one panel for absolute deviations of the effective funds rate from target and the other using the actual deviations. This chart clearly shows those days characterized by very high levels of intraday volatility or huge deviations of the effective rate from target, or both. But charts using these scales sacrifice detail about the behavior of the funds rate on most days.

Chart A1a

**Absolute Values of Deviations of the Daily Effective Federal Funds Rate from Target and the Standard Deviations of the Daily Effective Funds Rate  
All Business Days in 1995**

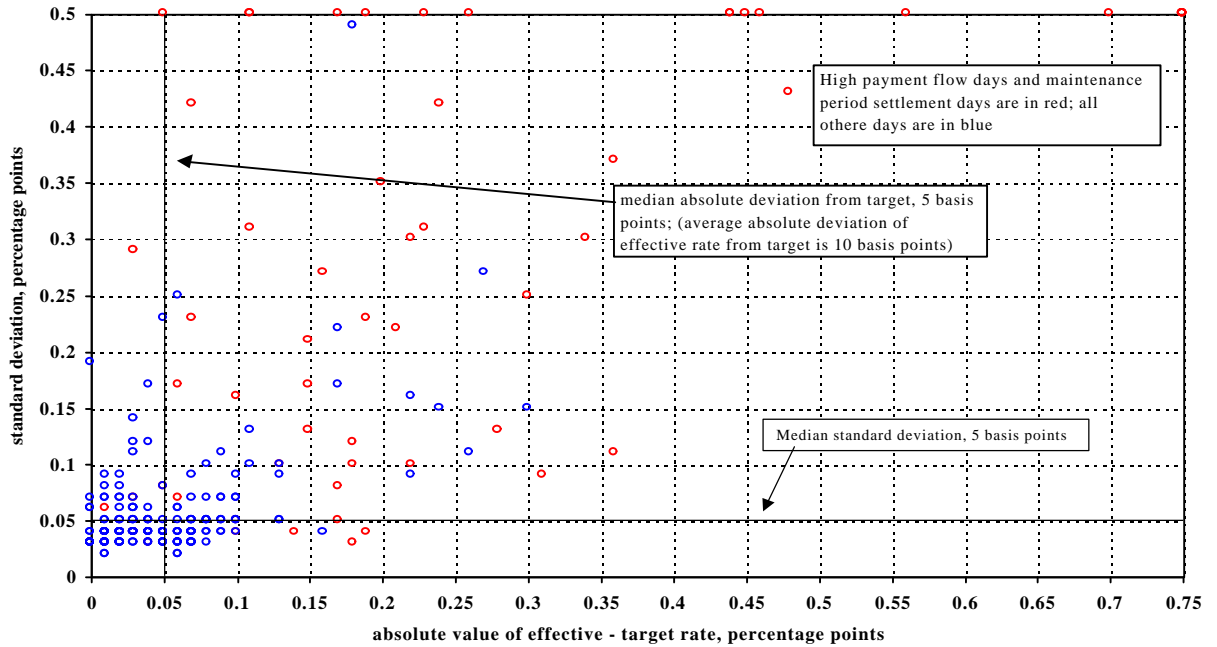


Chart A1b

**Absolute Values of Deviations of the Daily Effective Federal Funds Rate from Target and the Standard Deviation of the Daily Effective funds Rate  
All Business Days in 1996**

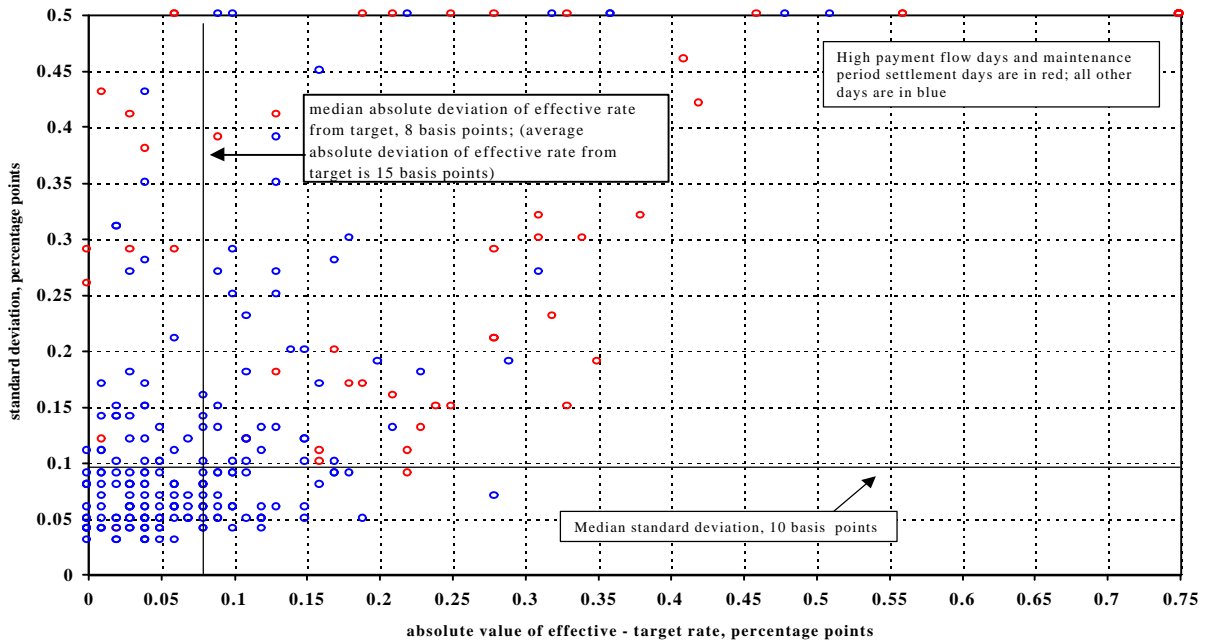


Chart A2a

**Deviations of the Daily Effective Federal Funds Rate from Target and the Daily Standard Deviations of the Funds Rate**  
All Business Days in 1995

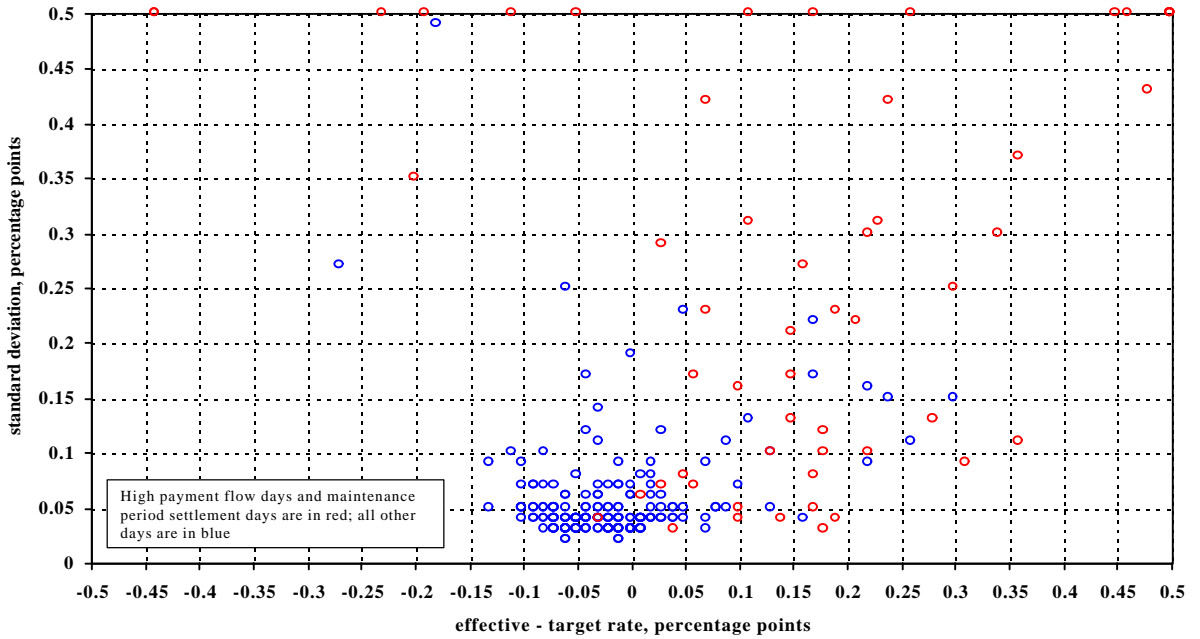


Chart A2b

**Deviations of the Daily Effective Federal Funds Rate from Target and the Daily Standard Deviations of the Funds Rate**  
All Business Days in 1996

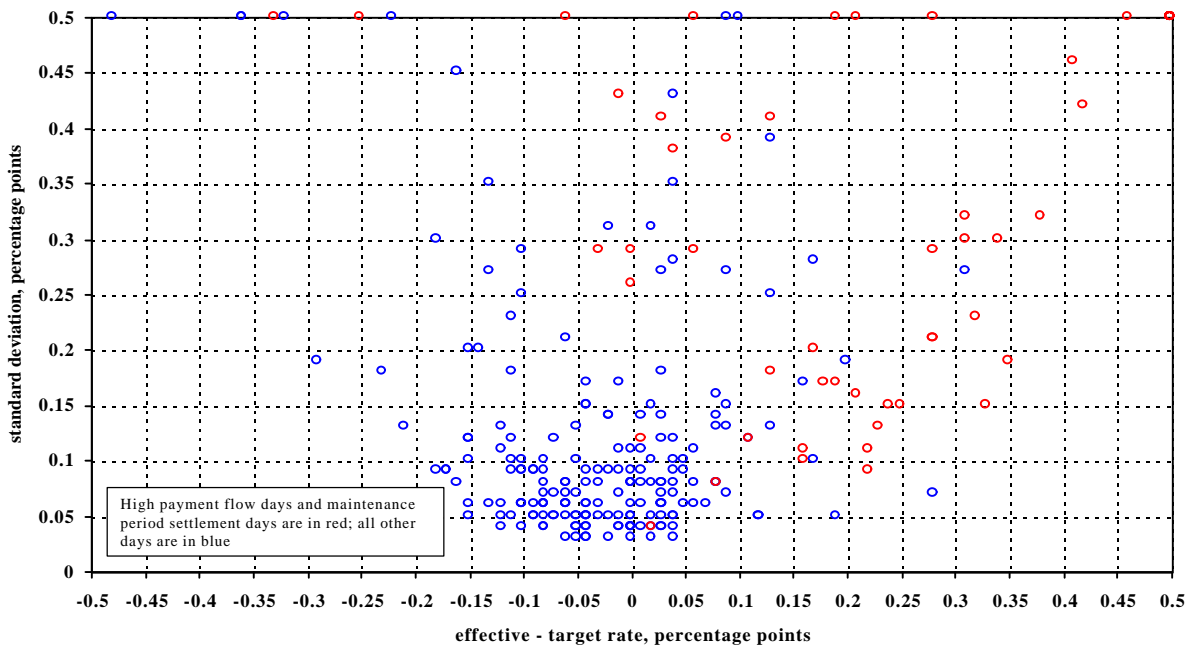


Chart A2c

**Deviations of the Daily Effective Federal Funds Rate from Target and the Daily Standard Deviations of the Funds Rate**  
All Business Days in 1997

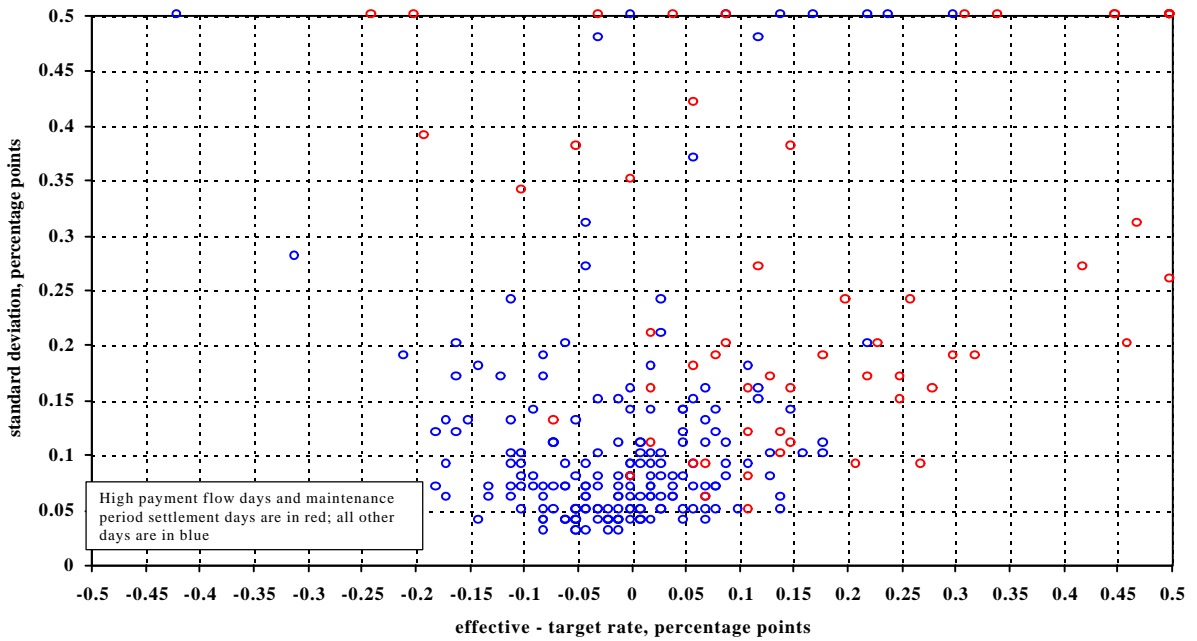


Chart A2d

**Deviations of the Daily Effective Federal Funds Rate from Target and the Daily Standard Deviations of the Funds Rate**  
All Business Days in 1998

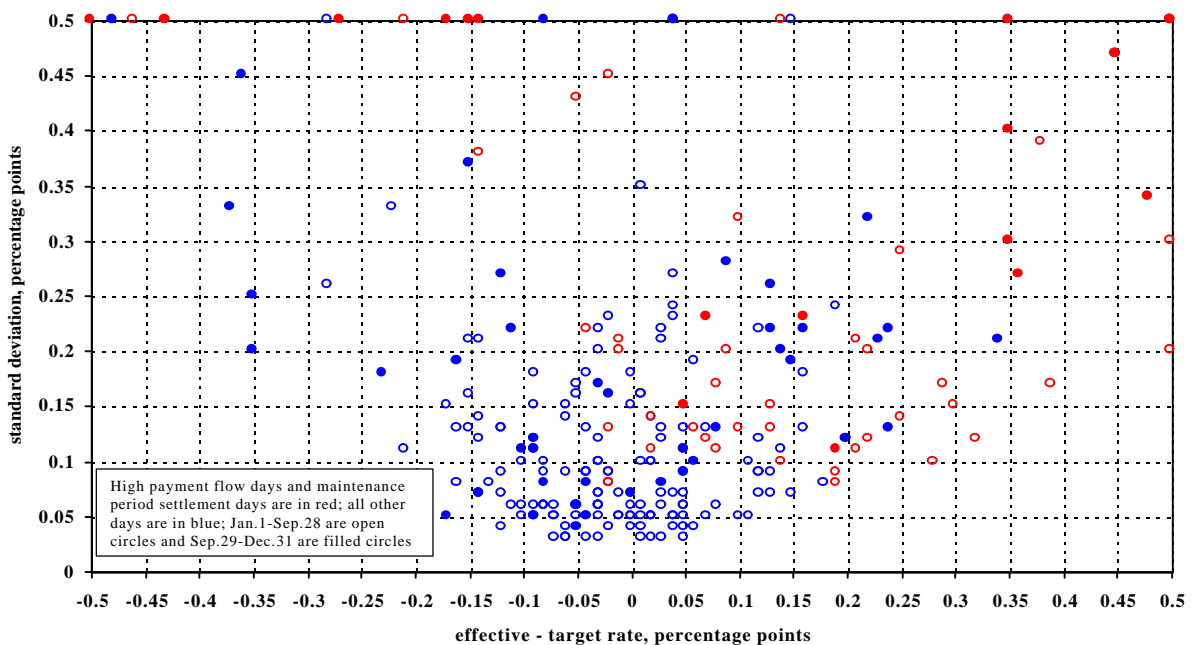


Chart A3a

**Absolute Values of Deviations of the Daily Effective Federal Funds Rate from Target and the Daily Standard Deviations of the Funds Rate**  
All Business Days in 1998

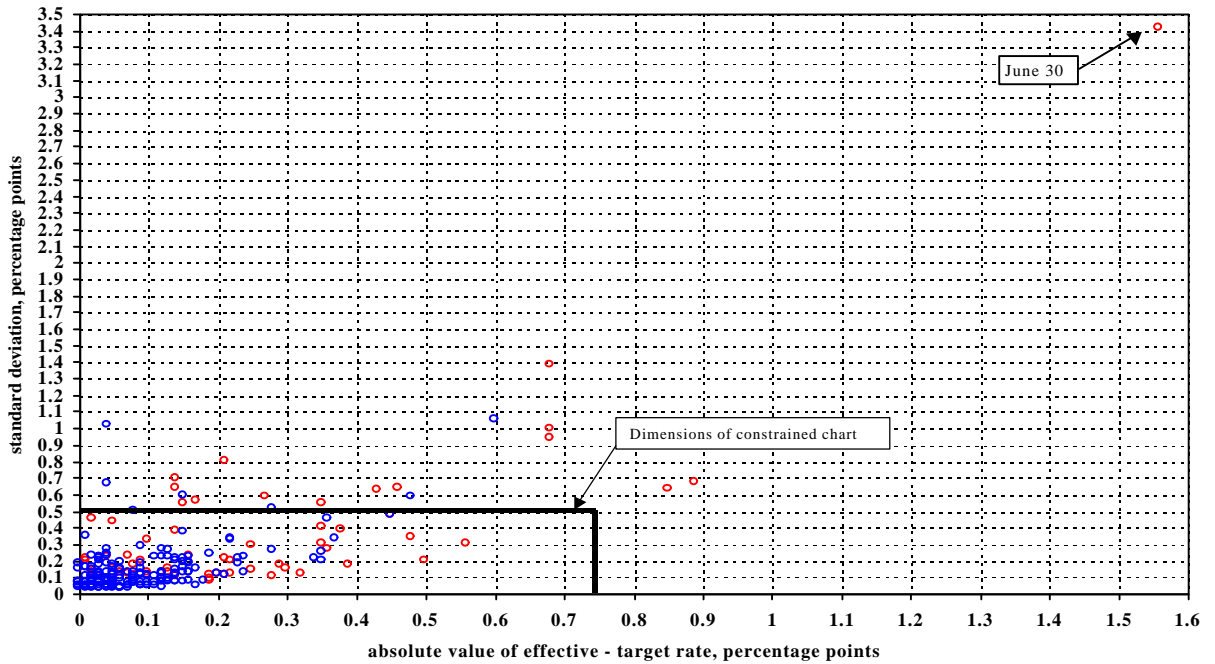
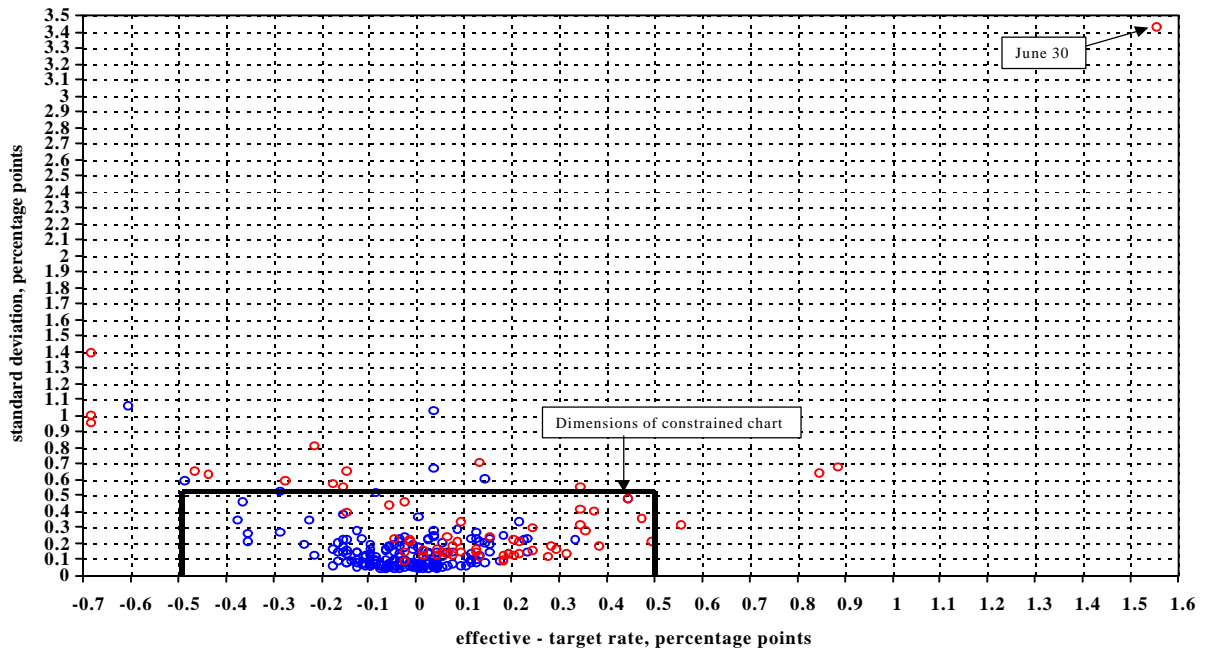


Chart A3b

**Deviations of the Daily Effective Federal Funds Rate from Target and the Daily Standard Deviations of the Funds Rate**  
All Business Days in 1998



## **APPENDIX B**

## **APPENDIX B: AUTHORIZATION FOR DOMESTIC OPEN MARKET OPERATIONS**

Open market operations during 1998 were conducted under the Authorization for Domestic Open Market Operations. Several changes were made to the Authorization in 1998. In February, the standing authorized limit on intermeeting period changes in System Account holdings of U.S. government and federal agency securities was increased to \$12 billion from \$8 billion. (No temporary changes to the leeway limit were made during the year.) Also at that meeting, the authority to conduct transactions in bankers acceptances was terminated. In November, the maximum maturity on repurchase agreements the Desk may arrange was extended to 60 days; the previous limit was 15 days. The Authorization for Domestic Open Market Operations in effect at the end of 1998 is reprinted below:

### *Authorization for Domestic Open Market Operations*

1. The Federal Open Market Committee authorizes and directs the Federal Reserve Bank of New York, to the extent necessary to carry out the most recent domestic policy directive adopted at a meeting of the Committee:
  - (a) To buy or sell U.S. Government securities, including securities of the Federal Financing Bank, and securities that are direct obligations of, or fully guaranteed as to principal and interest by, any agency of the United States in the open market, from or to securities dealers and foreign and international accounts maintained at the Federal Reserve Bank of New York, on a cash, regular, or deferred delivery basis, for the System Open Market Account at market prices, and, for such Account, to exchange maturing U.S. Government and Federal agency securities with the Treasury or the individual agencies or to allow them to mature without replacement; provided that the aggregate amount of U.S. Government and Federal agency securities held in such Account (including forward commitments) at the close of business on the day of a meeting of the Committee at which action is taken with respect to a domestic policy directive shall not be increased or decreased by more than \$12.0 billion during the period commencing with the opening of business on the day following such meeting and ending with the close of business on the day of the next such meeting;
  - (b) To buy U.S. Government securities and securities that are direct obligations of, or fully guaranteed as to principal and interest by, any agency of the United States from dealers for the account of the Federal Reserve Bank of New York under agreements for repurchase of such securities or obligations in 60 calendar days or less, at rates that, unless otherwise expressly authorized by the Committee, shall be determined by competitive bidding, after applying reasonable limitations on the volume of agreements with individual dealers; provided that in the event Government securities or agency issues covered by any such agreement are not repurchased by the dealer pursuant to the agreement or a renewal thereof, they shall be sold in the market or transferred to the System Open Market Account.
2. In order to ensure the effective conduct of open market operations, the Federal Open Market Committee authorizes and directs the Federal Reserve Banks to lend U.S. Government securities held in the System Open Market Account to Government



securities dealers and to banks participating in Government securities clearing arrangements conducted through a Federal Reserve Bank, under such instructions as the Committee may specify from time to time.

3. In order to ensure the effective conduct of open market operations, while assisting in the provision of short-term investments for foreign and international accounts maintained at the Federal Reserve Bank of New York, the Federal Open Market Committee authorizes and directs the Federal Reserve Bank of New York (a) for System Open Market Account, to sell U.S. Government securities to such foreign and international accounts on the bases set forth in paragraph 1(a) under agreements providing for the resale by such accounts of those securities within 60 calendar days on terms comparable to those available on such transactions in the market; and (b) for New York Bank account, when appropriate, to undertake with dealers, subject to the conditions imposed on purchases and sales of securities in paragraph 1(b), repurchase agreements in U.S. Government and agency securities, and to arrange corresponding sale and repurchase agreements between its own account and foreign and international accounts maintained at the Bank. Transactions undertaken with such accounts under the provisions of this paragraph may provide for a service fee when appropriate.

## **APPENDIX C**

**Operations in United States Government Securities and Federal Agency Securities**  
(Settlement date basis, in thousands)  
For the year ended December 31, 1998

	<u>Purchases</u>	<u>Sales</u>	<u>Redemptions</u>	<u>Exchanges</u>	<u>Net Changes</u>	<u>Holdings 12/31/1998</u>	<u>Holdings 12/31/1997</u>
System Open Market Account							
<b>Government Securities</b>							
<u>Treasury Bills</u>							
Outright	3,550,000	-	(2,000,000)	(450,835,206)	1,550,000	215,699,444	214,149,444
Matched Trans.	4,395,429,597	(4,399,329,961)	-	-	(3,900,364)	(20,927,110)	(17,026,746)
<b>Total Bills</b>	<b>4,398,979,597</b>	<b>(4,399,329,961)</b>	<b>(2,000,000)</b>	<b>-</b>	<b>(2,350,364)</b>	<b>194,772,334</b>	<b>197,122,698</b>
<u>Treas. Notes &amp; Bonds</u>							
<b>Maturing:</b>							
Within 1 year	6,296,900	-	(2,676,033)	(49,434,453)	(45,813,586) #	49,148,359	49,369,485
1 to 5 years	12,914,092 @	-	-	37,153,644	50,067,736 #	107,729,521	95,028,355
5 to 10 years	2,321,032 @	-	-	7,443,296	9,764,328 #	44,822,174	40,906,736
Over 10 years	4,893,174 @	-	-	4,844,024	9,737,198 #	55,668,491	48,308,293
<b>Total Notes and Bonds</b>	<b>26,425,198</b>	<b>-</b>	<b>(2,676,033)</b>	<b>6,511</b>	<b>23,755,676</b>	<b>257,368,545</b>	<b>233,612,869</b>
<b>Total Gov't secs.</b>							
Incl. Matched Trans.	4,425,404,795	(4,399,329,961)	(4,676,033)	6,512	21,405,313	452,140,879	430,735,567
(Excl. Matched Trans.)	29,975,198	-	(4,676,033)	6,512	25,305,677	473,067,989	447,762,313
<u>Federal Agency Issues</u>							
<b>Maturing:</b>							
Within 1 year	-	-	(322,000)	-	(322,000) &	101,900	252,000
1 to 5 years	-	-	-	-	- &	61,000	152,900
5 to 10 years	-	-	-	-	- &	174,650	254,650
Over 10 years	-	(25,000)	-	-	(25,000) &	-	25,000
<b>Total Agency</b>	<b>-</b>	<b>(25,000)</b>	<b>(322,000)</b>	<b>-</b>	<b>(347,000)</b>	<b>337,550</b>	<b>684,550</b>
<b>Total System Account</b>							
Incl. Matched Trans.	4,425,404,795	(4,399,354,961)	(4,998,033)	6,512	21,058,313	452,478,429	431,420,117
(Excl. Matched Trans.)	29,975,198	(25,000)	(4,998,033)	6,512	24,958,677	473,405,539	448,446,863
<u>F.R.B. of New York</u>							
Repurchase Agreements	796,987,000	(790,451,000)	-	-	6,536,000	30,376,000	23,840,000

Note: There were no customer related RP's passed though to the market for the year ended 12/31/1998

@\* includes appreciation of the inflation compensation on inflation indexed notes and bonds of \$42,681

# and & does not include the following maturity shifts:

		<u>Within 1 year</u>	<u>1 to 5 years</u>	<u>5 to 10 years</u>	<u>Over 10 years</u>
Treasury Notes & Bonds	#	45,592,460	(37,366,570)	(5,848,890)	(2,377,000)
Federal Agencies Issued	&	171,900	(91,900)	(80,000)	-

December 31, 1997 and December 31, 1998 the matched sale-purchase transaction was \$17,026,746,000 and \$20,927,110,000 respectively. Loans of Treasury securities by Federal Reserve Bank of New York to primary dealers for the year ended 12/31/1998 were as follows:

<u>F.R.B. of New York</u>	<u>Loans Outstanding</u>				
	<u>Securities Loans</u>	<u>Maturities</u>	<u>Net Change</u>	<u>12/31/1998</u>	<u>12/31/1997</u>
Loan Agreements	\$30,807,429	\$31,404,629	(\$597,200)	\$290,000	\$887,200

U.S. TREASURY AND FEDERAL AGENCY SECURITY HOLDINGS  
IN SYSTEM OPEN MARKET ACCOUNT  
(Statement date basis, in thousands)

	Holdings	% of Total	Net change		Holdings	% of Total	Net change
	<u>12/31/1998</u>	<u>Outstanding</u>	since		<u>12/31/1998</u>	<u>Outstanding</u>	since
			<u>12/31/1997</u>				<u>12/31/1997</u>
<u>Treasury Bills</u>				<u>Treasury Bonds (Cont'd)</u>			
Issues outstanding				Issues outstanding			
01/07/1999 #	109,320	0.3%	excluding bills	10.750 02/15/2003	739,250	24.6%	-
01/14/1999 #	156,860	0.7%		10.750 05/15/2003	380,800	11.7%	49,800
01/21/1999 #	6,533,390	13.8%		11.125 08/15/2003	514,300	14.7%	-
01/28/1999	7,342,815	31.8%		11.875 11/15/2003	870,340	12.0%	119,000
02/04/1999	14,018,010	26.0%		12.375 05/15/2004	769,786	20.5%	-
02/11/1999	7,534,485	32.2%		13.750 08/15/2004	528,000	13.2%	-
02/18/1999	7,621,564	32.5%		11.625 11/15/2004	994,600	12.0%	47,400
02/25/1999	7,688,180	33.5%		8.250 05/15/2005	1,513,660	35.8%	-
03/04/1999	13,214,955	32.5%		12.000 05/15/2005	728,476	17.1%	-
03/11/1999	7,591,780	32.6%		10.750 08/15/2005	1,187,000	12.8%	-
03/18/1999	7,304,310	32.0%		9.375 02/15/2006	133,000	2.8%	113,000
03/25/1999	6,954,235	30.9%		7.625 02/15/2007	1,396,164	33.0%	-
04/01/1999	12,662,430	32.1%		7.875 11/15/2007	378,500	25.3%	-
04/08/1999	3,645,000	31.3%		8.375 08/15/2008	788,500	37.5%	-
04/15/1999	4,105,000	33.7%		8.750 11/15/2008	1,588,500	30.4%	-
04/22/1999	3,695,000	31.6%		9.125 05/15/2009	921,205	20.0%	-
04/29/1999	8,440,000	31.7%		10.375 11/15/2009	1,075,939	25.6%	-
05/06/1999	3,935,000	32.1%		11.750 02/15/2010	717,400	28.8%	-
05/13/1999	3,800,000	32.2%		10.000 05/15/2010	1,176,556	39.4%	-
05/20/1999	3,855,000	32.5%		12.750 11/15/2010	1,260,865	26.6%	-
05/27/1999	9,090,000	33.5%		13.875 05/15/2011	1,073,542	23.3%	-
06/03/1999	3,840,000	32.4%		14.000 11/15/2011	975,091	19.9%	-
06/10/1999	3,900,000	30.9%		10.375 11/15/2012	1,611,741	14.6%	-
06/17/1999	3,775,000	31.2%		12.000 08/15/2013	3,040,772	20.6%	-
06/24/1999	7,925,000	30.9%		13.250 05/15/2014	869,450	17.4%	-
07/01/1999	3,540,000	32.0%		12.500 08/15/2014	905,720	17.7%	-
07/22/1999	5,305,000	33.7%		11.750 11/15/2014	1,195,000	19.9%	-
08/19/1999	5,565,000	35.3%		11.250 02/15/2015	1,335,733	10.5%	-
09/16/1999	5,390,000	34.9%		10.625 08/15/2015	1,167,400	16.3%	-
10/14/1999	5,650,000	33.9%		9.875 11/15/2015	941,500	13.6%	-
11/12/1999	5,225,000	32.2%		9.250 02/15/2016	880,000	12.1%	-
12/09/1999	5,360,000	32.8%		7.250 05/15/2016	1,098,000	5.8%	103,000
				7.500 11/15/2016	1,378,000	7.3%	115,000
12/31/1997 balances			(197,122,698)	8.750 05/15/2017	1,855,000	10.2%	405,000
				8.875 08/15/2017	1,494,000	10.7%	585,000
Total Treasury Bills	<u>194,772,334</u> #		<u>(2,350,364)</u>	9.125 05/15/2018	728,900	8.4%	232,000
				9.000 11/15/2018	304,000	3.4%	48,000
<u>Treasury Bonds</u>				8.875 02/15/2019	1,224,000	6.4%	291,000
Issues outstanding				8.125 08/15/2019	1,735,900	8.6%	45,000
11.750 02/15/2001	165,803	11.0%	5,000	8.500 02/15/2020	1,095,879	10.7%	135,000
13.125 05/15/2001	166,926	9.5%	1,200	8.750 05/15/2020	1,211,600	11.9%	145,000
13.375 08/15/2001	256,092	14.6%	-	8.750 08/15/2020	1,366,600	12.5%	-
15.750 11/15/2001	172,904	9.9%	-	7.875 02/15/2021	830,500	7.5%	55,000
14.250 02/15/2002	184,800	10.5%	25,000	8.125 05/15/2021	1,103,000	9.2%	165,000
11.625 11/15/2002	347,850	12.6%	-	8.125 08/15/2021	940,000	7.7%	260,000
				8.000 11/15/2021	1,695,000	5.2%	545,000

# Holdings were reduced by \$12,700,000 of January 7, T/BILLS and \$7,700,000 of January 14, T/BILLS and \$527,110 of January 21, T/BILLS that were sold under matched sale-purchase agreements which are returned the following day.

U.S. TREASURY AND FEDERAL AGENCY SECURITY HOLDINGS  
IN SYSTEM OPEN MARKET ACCOUNT  
(Statement date basis, in thousands)

		Holdings	% of Total	Net change			Holdings	% of Total	Net change
		<u>12/31/1998</u>	<u>Outstanding</u>	since <u>12/31/1997</u>			<u>12/31/1998</u>	<u>Outstanding</u>	since <u>12/31/1997</u>
<u>Treasury Bonds (Cont'd)</u>					<u>Treasury Notes (Cont'd)</u>				
Issues outstanding					Issues outstanding				
7.250	08/15/2022	605,000	5.8%	145,000	6.875	08/31/1999	1,101,480	8.9%	150,000
7.625	11/15/2022	810,000	7.6%	150,000	5.750	09/30/1999	667,380	3.8%	25,000
7.125	02/15/2023	1,981,000	10.8%	568,000	7.125	09/30/1999	1,349,752	10.6%	271,000
6.250	08/15/2023	1,447,000	6.3%	412,000	6.000	10/15/1999	406,115	3.9%	-
7.500	11/15/2024	565,000	4.9%	60,000	5.625	10/31/1999	732,000	4.4%	230,000
7.625	02/15/2025	875,000	7.5%	60,000	7.500	10/31/1999	1,107,315	9.2%	549,000
6.875	08/15/2025	1,345,000	10.7%	140,000	5.875	11/15/1999	2,790,968	12.2%	-
6.000	02/15/2026	999,000	7.7%	65,000	7.875	11/15/1999	814,000	7.6%	-
6.750	08/15/2026	1,050,000	9.6%	85,000	5.625	11/30/1999	1,131,175	6.7%	583,000
6.500	11/15/2026	1,470,000	12.8%	-	7.750	11/30/1999	1,408,145	11.9%	232,000
6.625	02/15/2027	530,000	5.1%	50,000	5.625	12/31/1999	795,780	4.8%	-
6.375	08/15/2027	730,000	6.8%	-	7.750	12/31/1999	1,379,665	11.1%	-
6.125	11/15/2027	2,505,000	11.1%	1,325,000	6.375	01/15/2000	689,545	6.8%	-
5.500	08/15/2028	1,771,808	15.0%	1,771,808	5.375	01/31/2000	1,140,730	6.5%	1,140,730
5.250	11/15/2028	945,000	8.6%	945,000	7.750	01/31/2000	1,125,440	9.3%	261,000
					5.875	02/15/2000	1,232,796	6.0%	386,000
	Matured in 1998			(30,750)	8.500	02/15/2000	1,204,000	11.3%	218,000
					5.500	02/29/2000	1,497,320	8.4%	1,497,320
Total Treasury Bonds		<u>68,642,352</u>		<u>9,235,458</u>	7.125	02/29/2000	1,477,290	11.9%	155,000
					5.500	03/31/2000	1,998,220	11.6%	1,998,220
<u>Treasury Notes</u>					<u>Treasury Notes</u>				
Issues outstanding					Issues outstanding				
6.375	01/15/1999	892,045	8.5%	-	6.875	03/31/2000	1,401,510	10.7%	60,000
5.000	01/31/1999	848,000	6.6%	91,000	5.500	04/15/2000	368,000	3.5%	8,000
5.875	01/31/1999	1,917,000	9.9%	1,172,000	5.625	04/30/2000	1,321,000	8.5%	1,321,000
5.000	02/15/1999	3,644,140	16.6%	-	6.750	04/30/2000	1,524,250	12.3%	500,000
8.875	02/15/1999	1,048,600	10.8%	97,000	6.375	05/15/2000	2,807,000	13.5%	-
5.500	02/28/1999	915,000	7.7%	200,000	8.875	05/15/2000	480,000	4.6%	-
5.875	02/28/1999	1,656,000	8.3%	457,000	5.500	05/31/2000	1,321,000	8.0%	1,321,000
5.875	03/31/1999	1,875,000	14.7%	-	6.250	05/31/2000	911,460	7.2%	68,000
6.250	03/31/1999	1,420,000	7.2%	-	5.375	06/30/2000	1,383,000	9.3%	1,383,000
7.000	04/15/1999	1,073,700	10.6%	-	5.875	06/30/2000	740,100	5.9%	-
6.375	04/30/1999	1,545,000	8.0%	320,000	5.375	07/31/2000	1,976,750	10.6%	1,976,750
6.500	04/30/1999	1,324,620	10.8%	105,000	6.125	07/31/2000	698,000	5.7%	243,000
6.375	05/15/1999	2,869,124	12.3%	-	6.000	08/15/2000	2,147,845	11.9%	837,900
9.125	05/15/1999	1,637,500	16.3%	-	8.750	08/15/2000	1,212,400	10.9%	54,000
6.250	05/31/1999	1,020,900	5.5%	282,900	5.125	08/31/2000	2,994,300	15.0%	2,994,300
6.750	05/31/1999	871,990	7.1%	185,000	6.250	08/31/2000	721,000	6.1%	71,000
6.000	06/30/1999	839,435	4.7%	195,000	4.500	09/30/2000	2,241,500	11.6%	2,241,500
6.750	06/30/1999	1,644,820	12.6%	-	6.125	09/30/2000	1,009,000	8.4%	-
6.375	07/15/1999	409,000	4.1%	60,000	4.000	10/31/2000	2,462,900	12.0%	2,462,900
5.875	07/31/1999	1,421,970	8.5%	325,000	5.750	10/31/2000	729,430	6.0%	192,000
6.875	07/31/1999	1,531,400	12.4%	-	5.750	11/15/2000	1,888,200	11.8%	237,000
6.000	08/15/1999	2,676,110	11.8%	444,000	8.500	11/15/2000	882,300	7.7%	1,300
8.000	08/15/1999	943,600	9.3%	85,000	4.625	11/30/2000	2,032,200	10.1%	2,032,200
5.875	08/31/1999	1,439,630	8.4%	135,000	5.625	11/30/2000	878,200	7.1%	232,000
					4.625	12/31/2000	2,554,662	13.1%	2,554,662
					5.500	12/31/2000	891,000	7.0%	-

U.S. TREASURY AND FEDERAL AGENCY SECURITY HOLDINGS  
IN SYSTEM OPEN MARKET ACCOUNT  
(Statement date basis, in thousands)

		Holdings	% of Total	Net change			Holdings	% of Total	Net change
		<u>12/31/1998</u>	<u>Outstanding</u>	since <u>12/31/1997</u>			<u>12/31/1998</u>	<u>Outstanding</u>	since <u>12/31/1997</u>
<u>Treasury Notes (Cont'd)</u>					<u>Treasury Notes (Cont'd)</u>				
Issues outstanding					Issues outstanding				
5.250	01/31/2001	800,000	6.2%	-	7.500	02/15/2005	1,291,600	9.4%	141,600
5.375	02/15/2001	1,532,560	10.0%	1,532,560	6.500	05/15/2005	2,000,000	13.6%	-
7.750	02/15/2001	993,500	8.8%	64,000	6.500	08/15/2005	1,800,000	12.0%	-
5.625	02/28/2001	1,061,000	8.3%	160,000	5.875	11/15/2005	1,700,000	11.2%	-
6.375	03/31/2001	1,630,000	11.5%	30,000	5.625	02/15/2006	1,708,000	11.0%	208,000
6.250	04/30/2001	1,257,500	9.1%	319,000	6.875	05/15/2006	2,075,000	13.0%	-
5.625	05/15/2001	2,270,117	17.7%	2,270,117	7.000	07/15/2006	2,724,752	12.0%	459,000
8.000	05/15/2001	1,473,000	11.9%	316,000	6.500	10/15/2006	2,577,800	11.5%	145,000
6.500	05/31/2001	1,074,900	7.8%	163,000	6.250	02/15/2007	840,000	6.4%	300,000
6.625	06/30/2001	1,175,000	8.2%	-	6.625	05/15/2007	1,750,000	12.5%	-
6.625	07/31/2001	957,000	6.8%	84,000	6.125	08/15/2007	2,518,000	9.8%	343,000
7.875	08/15/2001	1,469,400	11.9%	94,400	5.500	02/15/2008	1,420,000	10.5%	1,420,000
6.500	08/31/2001	1,041,300	7.5%	181,000	5.625	05/15/2008	4,084,000	15.0%	4,084,000
6.375	09/30/2001	1,144,100	7.9%	107,100	4.750	11/15/2008	1,135,000	8.4%	1,135,000
6.250	10/31/2001	949,000	6.5%	66,000	Matured in 1998				(52,079,735)
7.500	11/15/2001	2,824,000	11.7%	383,000	Total Treasury Notes				<u>184,960,020</u>
5.875	11/30/2001	729,000	5.2%	253,000					<u>12,427,009</u>
6.125	12/31/2001	900,000	6.4%	275,000	<u>Treasury inflation Index Bonds (IIB)</u>				
6.250	01/31/2002	1,105,000	8.2%	328,000	Issues outstanding				
6.250	02/28/2002	944,400	6.9%	141,400	3.625	04/15/2028	820,000	4.9%	820,000
6.625	03/31/2002	1,400,900	9.8%	420,000	Matured in 1998				-
6.625	04/30/2002	1,292,500	9.0%	257,500	Total Treasury IIB				<u>820,000</u>
7.500	05/15/2002	1,341,009	11.5%	325,000	<u>Treasury inflation Index Notes (IIN)</u>				
6.500	05/31/2002	1,132,000	8.4%	183,000	Issues outstanding				
6.250	06/30/2002	867,000	6.6%	81,000	3.625	07/15/2002	900,000	5.4%	-
6.000	07/31/2002	442,000	3.6%	147,000	3.375	01/15/2007	832,000	5.3%	82,000
6.375	08/15/2002	2,612,000	11.0%	365,000	3.625	01/15/2008	1,135,000	6.8%	1,135,000
6.250	08/31/2002	942,000	7.4%	241,000	Matured in 1998				-
5.875	09/30/2002	635,000	5.0%	175,000	Total Treasury IIN				<u>2,867,000</u>
5.750	10/31/2002	710,000	6.1%	320,000	<u>Total Treasury Bonds,</u>				
5.750	11/30/2002	644,000	5.3%	244,000	<u>IIN, IIB and Notes</u>				
5.625	12/31/2002	700,000	5.8%	115,000	<u>257,289,372</u>				
5.500	01/31/2003	802,000	6.1%	802,000	<u>FNMA SMS</u>				
6.250	02/15/2003	2,160,000	9.2%	15,000	Issues outstanding				
5.500	02/28/2003	1,199,000	8.8%	1,199,000	9.550	03/10/1999	25,000	3.6%	-
5.500	03/31/2003	1,385,000	9.8%	1,385,000	8.700	06/10/1999	23,000	2.8%	-
5.750	04/30/2003	1,010,000	8.0%	1,010,000	8.450	07/12/1999	5,000	1.0%	-
5.500	05/31/2003	1,115,000	8.5%	1,115,000	8.350	11/10/1999	7,000	0.4%	-
5.375	06/30/2003	1,309,000	10.0%	1,309,000					
5.250	08/15/2003	2,834,000	14.3%	2,834,000					
5.750	08/15/2003	3,685,000	13.2%	-					
4.250	11/15/2003	1,518,385	8.2%	1,518,385					
5.875	02/15/2004	650,000	5.0%	-					
7.250	05/15/2004	1,940,550	13.5%	35,000					
7.250	08/15/2004	835,000	6.3%	25,000					
7.875	11/15/2004	1,753,040	12.3%	-					

@ Do not reflect \$79,173 inflation compensation.

U.S. TREASURY AND FEDERAL AGENCY SECURITY HOLDINGS  
IN SYSTEM OPEN MARKET ACCOUNT  
(Statement date basis, in thousands)

	Holdings <u>12/31/1998</u>	% of Total <u>Outstanding</u>	Net change since <u>12/31/1997</u>
<u>FNMA SMS (Cont'd)</u>			
Issues outstanding			
6.100 02/10/2000	25,000	5.0%	-
9.050 04/10/2000	10,000	1.3%	-
9.200 09/11/2000	10,000	2.5%	-
6.625 04/10/2003		0.0%	(30,000)*
6.450 06/10/2003		0.0%	(25,000)*
5.800 12/10/2003	10,000	1.3%	-
7.550 06/10/2004	24,650	3.1%	-
8.250 10/12/2004	30,000	7.5%	-
6.850 09/12/2005	20,000	5.0%	-
6.700 11/10/2005	100,000	25.0%	-
10.350 12/10/2015		0.0%	(10,000)
8.200 03/10/2016		0.0%	(15,000)
			<u>(328,000)</u>
Matured in 1998			<u>(328,000)</u>
Total FNMA SMS	<u>289,650</u>		<u>(328,000)</u>
<u>FHLBB LTDS</u>			
Issues outstanding			
9.300 01/25/1999	2,000	0.6%	-
8.600 06/25/1999	3,900	1.2%	-
8.450 07/26/1999	5,000	2.0%	-
8.600 08/25/1999	11,000	4.5%	-
8.375 10/25/1999	10,000	3.7%	-
8.600 01/25/2000	6,000	2.0%	-
			<u>(19,000)</u>
Matured in 1998			<u>(19,000)</u>
Total FHLBB LTDS	<u>37,900</u>		<u>(19,000)</u>
<u>FCA NYCS</u>			
Issues outstanding			
8.650 10/01/1999	10,000	2.9%	-
			<u>-</u>
Matured in 1998			<u>-</u>
Total FCA NYCS	<u>10,000</u>		<u>-</u>
* Called Issued			
Total Agency Issues	<u>337,550</u>		<u>(347,000)</u>
Total Treasury & Agency Issues	<u>452,399,256</u>		<u>265,206,624</u>