

# ECONOMIC COMMENTARY

Federal Reserve Bank of Cleveland

## Federal Funds Rate Volatility

by Diana Dumitru and E. J. Stevens

The federal funds rate was unusually volatile for several months starting in late December 1990. Day-to-day changes over this period were far greater than in previous years, although the difference seems to have disappeared recently (figure 1A).

The federal funds rate is the interest rate banks charge one another for unsecured overnight loans of their deposit balances at Federal Reserve Banks. Borrowers and lenders in the funds market are almost exclusively depository institutions, who see the funds rate as the market price at which Fed deposits can be acquired to make payments or to meet reserve requirements. The rate is also a short-run indicator of the monetary policy intentions of the Federal Open Market Committee (FOMC), which controls the supply of reserve assets. Volatility would be a serious concern if confusion about FOMC policy intentions caused market participants to make bad decisions.

Sharp changes in the funds rate are typical near the end of a year, when financial institutions make temporary balance-sheet adjustments, a practice known as "window dressing." Because these adjustments usually last only a few days, they cannot explain the recent protracted period of funds rate volatility. Easing of monetary policy during this unstable period, which allowed a number of downward adjustments in the rate, also fails to account for much of the variation. More important are two effects of an unrelated substantial cut in reserve requirements in December. The first is that until banks

and the Fed learned to manage smaller reserve positions, the funds rate moved sharply on final, settlement days of reserve maintenance periods. The second effect is that the lower quantity of required reserves prevented borrowers and lenders from responding to day-to-day funds rate movements in the way that normally dampens variations. This *Economic Commentary* examines the role of policy easings and reduced reserve requirements in the recent episode of funds rate volatility.

### ■ Policy Easings

Neither actual changes in monetary policy nor potential market uncertainty about policy intentions appears to have contributed significantly to the increased funds rate volatility. The FOMC implements monetary policy by specifying a desired degree of reserve restraint to be maintained by open-market operations, normally reflected in the size of the rate spread between the discount rate (the rate banks pay to borrow directly from the Fed) and the funds rate. The lower the degree of restraint, the lower will be the funds rate relative to the discount rate. Market participants and analysts ("Fedwatchers") read public announcements of discount rate changes and are quite adept at recognizing independent FOMC adjustments of reserve restraint. Deducting market estimates of occasional policy-intended changes from actual changes in the level of the funds rate has little effect on the volatility comparisons, as shown in figure 1B.<sup>1</sup>

Increased market uncertainty about current and impending policy also can

A cut in reserve requirements late in 1990 apparently contributed to increased federal funds rate volatility early this year. Legal reserve requirements are the principal source of demand for holding deposits at Federal Reserve Banks. This article suggests that although the recent episode of funds rate volatility was short-lived and did not cloud market perceptions of Federal Reserve policy intentions, the effect of dwindling reserve deposits on banking, payment, and monetary policy practices should be examined more extensively.

affect the funds rate. The less certain the perception of policy, the greater will be the range within which interest rates might trade without inducing borrowers or lenders to enter the market to take advantage of low or high rates. However, market commentary reported through wire information services and in newspapers during this episode contained no hint of unusual, or unusually wide, differences of opinion about the funds-rate level thought to be consistent with FOMC directives. Moreover, increased volatility was restricted to markets for instruments with the shortest maturities. For example, the interest rate on overnight repurchase agreements, a widely traded form of secured overnight loan, showed a comparable increase in volatility; no increase emerged in markets for three-month or long-term Treasury securities.

In large part, uniform perceptions of policy can be traced to consistent signals emitted by routine operations of the "Desk," the domestic securities trading department of the Federal Reserve Bank of New York, which conducts open-market operations on behalf of the FOMC. Fedwatchers make daily estimates of the amount of reserves they think the Desk must add or drain to maintain the perceived degree of reserve restraint, indexed by a level of the funds rate. Actual open-market operations are then scrutinized for their consistency with preserving the funds rate at, or returning it to, that perceived target. Comparing the three-month periods before and after the December reserve requirement reduction indicates no change in policy implementation.<sup>2</sup>

#### ■ Reduced Reserve Requirements

In December 1990, the Board of Governors reduced reserve requirements from 3 percent to zero on Eurocurrency liabilities and on nonpersonal time deposits of less than 1½ years maturity. Half the reduction took effect on December 13, and the full reduction began on December 27.<sup>3</sup> All else equal, the change would have produced a decline of almost \$14 billion in the quantity of reserve assets (deposits at the Fed plus

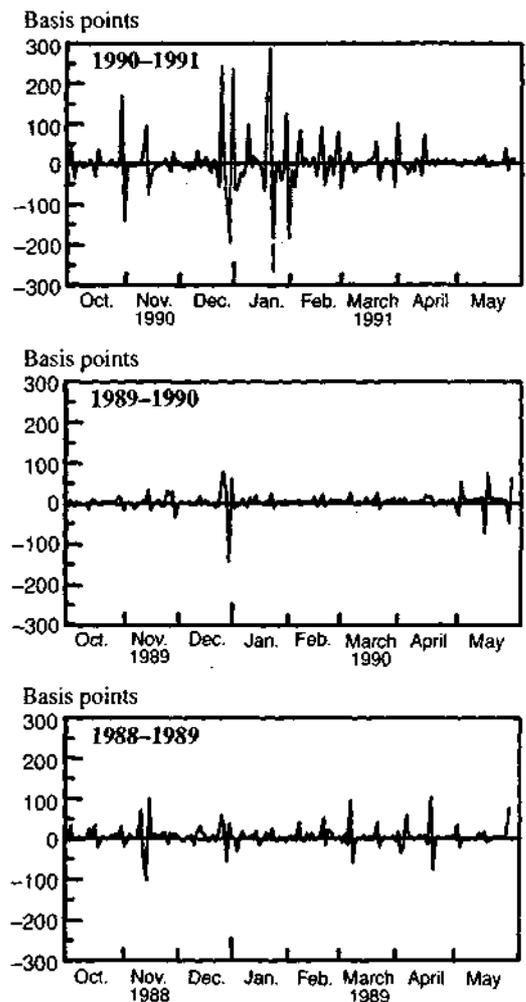
vault cash) demanded by banks to meet reserve requirements.

The FOMC must match any reduction in demand for reserve assets with an equivalent reduction in supply in order to maintain its desired degree of reserve restraint. This is because individual banks have no incentive to hold non-interest-bearing excess reserves overnight as long as the funds rate is above zero. Allowing a \$14 billion decline in required reserve demand to be translated into an equivalent excess supply initially would have sent the funds rate plunging to zero until the excess supply had been eliminated by excessive expansion of money and bank credit. That is, if banks were to work off a \$14 billion excess supply of reserve assets in the long run by investing in earning assets, the excess funds would not be completely absorbed by increased requirements until transactions deposits rose at least \$117 billion (\$14 billion is 12 percent — the highest marginal reserve requirement — of \$117 billion). This increase would have exceeded the cumulative growth in transactions deposits over the entire preceding four-year period.

The Desk's job of reducing supply had to focus on reserve deposits rather than on vault cash. Banks' demands for vault cash are largely determined by operating needs, not by reserve requirements, and vault cash applied to required reserves increased by a normal seasonal amount over the first four biweekly reserve maintenance periods following December's cut in requirements.

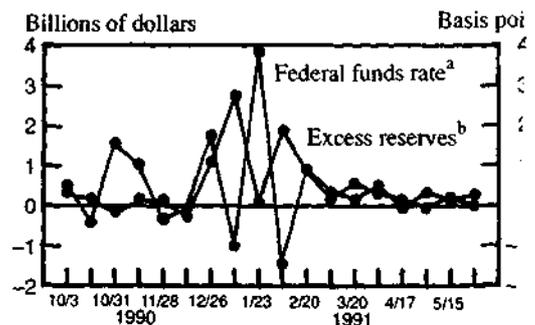
Actual holdings of reserve deposits, on the other hand, plummeted over the same period, from \$34 billion to less than \$19 billion. This enormous contraction in the supply of reserve deposits was almost, but not entirely, equal to the combined reduction in demand stemming from 1) the increase in vault cash applied to reserve requirements, 2) the cut in reserve requirements, and 3) a normal seasonal decline in reservable transactions deposits. Any remainder — whether more or less than demanded — would have been included in measured excess reserve deposits.<sup>4</sup>

FIGURE 1A DAY-TO-DAY CHANGES IN THE FEDERAL FUNDS RATE



SOURCE: Board of Governors of the Federal Reserve System.

FIGURE 2 SETTLEMENT-DAY EFFECTS



a. Deviation on settlement day from the average level over the previous 13 days of the period.

b. Deviation of maintenance-period average from April-September 1990 average.

SOURCE: Board of Governors of the Federal Reserve System.

FIGURE 1B DAY-TO-DAY CHANGES EXCLUDING POLICY ADJUSTMENTS

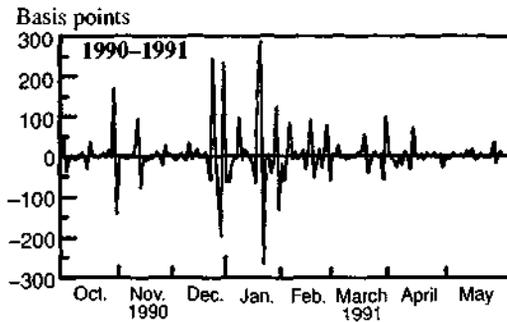
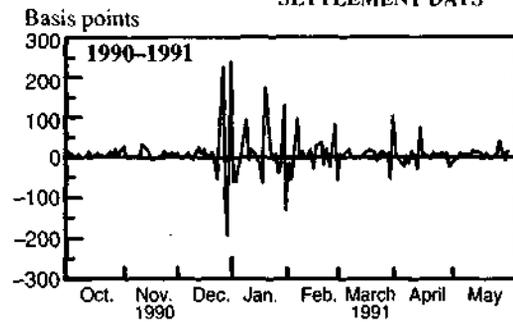


FIGURE 1C DAY-TO-DAY CHANGES EXCLUDING POLICY ADJUSTMENTS AND SETTLEMENT DAYS



SOURCE: Board of Governors of the Federal Reserve System.

*Settlement-Day Rate Volatility.* One source of increased funds rate volatility can be traced to the Desk's inability to determine the exact amount of reserves to supply in order to cover transitional increases in involuntary demands for excess reserve deposits. The cut in reserve requirements meant that some banks no longer had to hold any reserve deposits because their operating needs for vault cash became more than adequate to satisfy their reduced requirements.<sup>5</sup> In fact, between mid-December and early February, such surplus vault cash holdings grew about \$2 billion more than in the same period of the two previous years. Until the additional banks holding surplus vault cash (as well as those with substantially reduced needs to hold reserve deposits) developed methods for operating with zero or very small reserve deposit balances, their "demand" for excess reserve deposits could be said to have increased.

Desk "errors" in offsetting excess reserve "demand" by increasing the reserve deposit supply would be expected to show up in the funds rate, especially on the last, settlement day of a maintenance period. Because banks must hold required reserves only on average over a 14-day maintenance period, they have more tolerance for unwanted or deficient holdings of reserve deposits before the last day, intending to offset them later.

Excess reserve deposits averaged slightly less than \$1 billion over the six months prior to December's cut in reserve requirements. Although the supply doubled in the first period of reduced requirements, the total was insufficient to prevent the settlement-day funds rate from rising almost 200 basis points above its average level on the previous 13 days of the period. Thereafter, the amount of additional excess reserves supplied and the deviation of the settlement-day funds rate from its average over the prior 13 days moved in an exaggerated inverse pattern through successive maintenance periods in January and February (see figure 2). This inverse relationship continued through May, but was far less pronounced, suggesting that the demand and supply of reserves began to stabilize close to the previous average level of excess reserves.

*Arbitrage Breakdown.* The most unusual aspect of this episode was that, even after deducting policy-related changes and eliminating settlement days from the comparisons, the funds rate still was more volatile than in previous years (figure 1C). Normally, with a clear market expectation of a funds-rate level consistent with the FOMC's desired degree of reserve restraint, arbitrage between days within a maintenance period can maintain a reasonably stable effective rate. When the rate comes under upward pressure, banks lend funds, postponing

their accumulation of reserve deposit holdings to take advantage of the anticipated future opportunity to borrow when the rate has declined to the expected level. Similarly, when the rate comes under downward pressure, banks borrow funds, accelerating their accumulation of reserve deposit holdings to take advantage of the anticipated future opportunity to lend, or to avoid borrowing, when the rate has risen to the expected level.

Arbitrage became less effective in smoothing the funds rate because lower reserve requirements reduced borrowers' and lenders' need for reserves. This dampened their ability to respond to pressures on the daily rate emanating from variations in the daily supply and distribution of reserve deposits. That is, lower reserve requirements reduced banks' demand for reserve deposits that could be postponed (limiting rate increases) or accelerated (limiting rate decreases). Initially, the decline in demand was even greater than the cut in requirements because it was augmented by seasonal shrinkage of reservable transactions deposits and seasonal increases in vault cash.<sup>6</sup> With an unchanged, stiff penalty for overnight overdrafts, arbitrage became more restricted. And with banks' apparent unwillingness to rely more heavily on the discount window than on the funds market, more limited arbitrage resulted in wider movements in the funds rate.

## ■ Conclusion

Federal funds rate volatility died down after February for the reverse of some of the reasons it had increased. Bounds on arbitrage widened, as required reserves increased from seasonal lows and were augmented by increased holdings of clearing balances at a number of banks.<sup>7</sup> In addition, banks gained experience in managing smaller deposit balances, while the Desk became more adept both at matching supply to demand for excess reserves and at offsetting day-to-day demand and supply variations that otherwise might have moved the funds rate.

The brief episode of substantial interest rate volatility in the overnight markets, while perhaps initially puzzling, turned out to be no cause for immediate concern: Volatility did not seem to cloud market perceptions of the FOMC's desired degree of reserve restraint. However, this incident should serve as a reminder that legal reserve requirements are the major source of demand for holding deposits at Federal Reserve Banks. Reductions in these requirements and a long-term trend toward satisfying them with vault cash eliminate that demand. Thus, we need to pay greater attention to the effect of dwindling reserve deposit balances on banking, payment, and monetary policy practices. Otherwise, recurring episodes of funds rate volatility may create con-

fusion about FOMC policy intentions and lead market participants to make bad decisions.

## ■ Footnotes

1. We obtained the morning rate, perceived target, and Fedwatchers' interpretations from Knight-Ridder's MoneyCenter service. If, for example, market analysts believed that the perceived target was lowered by 25 basis points, but the day-to-day change was 27 basis points, the actual change plotted was two basis points because the other 25 points resulted from a policy shift.
2. The morning funds rate deviated from the market-perceived target range on 23 days between September 4 and December 4, 1990, and on 26 days between December 4, 1990 and March 4, 1991 (omitting the days before, of, and after each perceived policy change). The Desk conducted policy operations consistent with moving the funds rate back into the market-perceived range on 20 days during the first period and on 23 days during the second period. On the remaining days, Fedwatchers attached no policy significance to the possible inconsistency.
3. The cut took effect on January 17, 1991 for small institutions holding reserves on a quarterly basis.
4. Biweekly reserves data are published regularly in the *Federal Reserve Bulletin*, table I.12.
5. To a limited extent, banks might have wanted to reduce vault cash rather than to hold excess reserve deposits, but they could not have done so immediately because the cut in reserve requirements was not announced soon enough. Vault cash eligible to meet reserve requirements is the amount held during a two-

week period ending 30 days prior to the end of a two-week reserve maintenance period. The cut in reserve requirements was announced on December 4, 1990; vault cash for the first maintenance period, ending December 26, was the amount held during the two-week period ending November 26.

6. The breakdown in arbitrage was evident within, as well as between, days. Volatility within days increased sharply, as measured by deviations of the effective rate from the morning and closing rates, and by deviations of the morning from the closing rate.
7. Clearing balances are deposits at Federal Reserve Banks that yield earnings credits used to offset charges for priced services. A bank enters into an agreement to hold a predetermined average clearing balance for a reserve maintenance period. A bank meeting all or most of its required reserve with vault cash is likely to find a clearing account useful. Targeting a positive clearing account balance reduces the chance that an unexpected debit will tip the bank into an overdraft position subject to penalty.

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