Monetary Policy and Open Market Operations during 1990

Overview

During 1990, the Federal Open Market Committee responded to signs of weakening economic activity and financial market fragility by shifting toward a more accommodative policy The Committee relaxed reserve pressures several times in the second half of the year to alleviate financial market strains and, in the final months, to counter contractionary influences on the economy.

Over the first half of the year, policy was essentially on hold following a move to ease reserve pressures in mid-December 1989. The risks of inflation and of economic weakness were seen as being about evenly balanced, higher food and fuel costs helped lift prices early in the year while the economy experienced only slow growth In mid-July, the Federal Open Market Committee (FOMC) acted to ease reserve conditions to offset a degree of credit restraint on the part of lending institutions that was deemed "greater than anticipated or appropriate." Policy then held steady in the immediate aftermath of the Iraqi invasion of Kuwait in August. Surging petroleum prices threatened simultaneously to worsen inflation and to plunge an already sluggish economy into a downturn, and a period of some turmoil ensued in many financial markets. In late October the FOMC eased reserve pressures amid growing evidence of softening economic activity and after the conclusion of a budget agreement involving a large reduction in the federal deficit over the next several years. Over the final months of 1990, the economy weakened considerably, concerns about the condition of the financial system increased, the monetary aggregates expanded anemically, and underlying inflation pressures appeared to ebb The Committee responded by stepping up the pace of accommodation through three more easing moves. Prompted by similar concerns, the Board of Governors of the Federal Reserve System approved a reduction in the discount rate in December The Board also eliminated reserve requirements on nontransactions deposits, in part to counter the contractionary effects of banks' tightening credit standards and lending terms.

The onset of the recession in the second half of the year ended eight years of economic growth, the longest recorded peacetime expansion in U.S. history. With GNP declining in the final quarter, the economy expanded a mere 0 5 percent (fourth quarter over fourth quarter) over the year as a whole, and most major spending components of GNP either slowed in growth or fell. The downturn was at least exacerbated, and perhaps brought on, by the Persian Gulf crisis Meanwhile, rising energy costs generated by developments in the Middle East helped lift most broad inflation mea-

Adapted from a report submitted to the Federal Open Market Committee by Peter D Sternlight, Executive Vice President of the Bank and Manager for Domestic Operations of the System Open Market Account Cheryl Edwards, Senior Economist, Open Market Analysis Division, and R Spence Hilton, Senior Economist, Open Market Analysis Division, were primarily responsible for the preparation of this report under the guidance of Ann-Marie Meulendyke, Manager, Open Market Department Other members of the Open Market Analysis Division assisting in the preparation were Robert Van Wicklen, Theodore Tulpan, John Krafcheck, and John Phelan Judy Cohen, from the Domestic Research Department, also assisted

sures to their highest levels since the early 1980s. For the year as a whole, consumer price inflation excluding the volatile food and fuel components edged up on balance, although by other measures, underlying inflation and labor cost pressures did not intensify.

Yields on investment grade fixed-income securities responded to changes in the outlook for economic growth and inflation and to prospective and actual monetary policy developments. Through the first four months of the year, yields trended up because of rising food and energy costs, an apparent pickup in economic activity, higher interest rates abroad, and prospects of much heavier Treasury borrowing. Most rates changed direction and moved lower over the next few months in response to accumulating evidence of economic weakness and speculation that the System would ease monetary policy. At the onset of the Persian Gulf crisis in August, longer term yields jumped and rates on shorter dated instruments posted lesser increases as skyrocketing energy prices fanned inflation fears During the final months of the year, most yields moved steadily lower as oil prices eased off their highs, a federal budget accord was reached, and the Federal Reserve took a series of measures intended to help revive the faltering economy. On balance, the yield curve for Treasury securities steepened over the course of the year.

A slumping economy coming atop a high level of financial indebtedness contributed to growing strains in many financial markets in 1990. Borrowing became more difficult for less than top-rated borrowers. Some degree of dislocation was evident at times in many financial markets, especially during the second half of the year. The market for below-investment-grade securities, which had already been buffeted by a series of developments late in 1989, deteriorated dramatically in 1990. Meanwhile, the financial position of many bank holding companies deteriorated, posing potentially serious consequences for the financial system as a whole. The profitability of a large number of banks suffered as the value of their loan portfolios declined, especially for real estate-related activities. During the year, the outstanding debt of many banking institutions was downgraded, and market yields on much of this debt soared At the same time, there were growing indications that banks were cutting back on the availability of credit, even for creditworthy customers, although the magnitude of this credit squeeze remained uncertain Monetary policy moves during the latter half of the year were intended in part to relieve the effects of the credit restrictions.

Growth of the broader monetary aggregates in 1990 fell below the previous year's pace M2 advanced 3.9 percent (fourth quarter over fourth quarter), while M3 rose just 1.7 percent.[1] Both measures expanded much more slowly in the second half of the year and finished well down in their respective growth cones. A soft economy, retrenchment in bank lending, and a quickened pace of thrift resolutions all helped to restrain the growth of these aggregates Nonfinancial debt also increased more slowly in 1990; it rose 6 8 percent and finished well within its monitoring range Meanwhile, growth in M1 rebounded in 1990 after posting a meager gain in the previous year, boosted by rapid growth in currency (much of which apparently went overseas), M1 advanced 4.2 percent

Implementation of monetary policy continued to be complicated by the strong reluctance of many depository institutions to borrow from the discount window under the adjustment credit program. The Desk's formal operating procedures continued to make use of an assumption for borrowing that presumes a reasonably stable relationship between the amount of borrowing and the spread between the federal funds and discount rates Instances of unusual reluctance to use the discount window, which have hampered the Desk's operations for several years, multiplied in 1990; many depository institutions feared that their presence at the window might be misconstrued as a symptom of fundamental financial difficulty. On occasions when borrowing had to rise to make up a shortfall in nonborrowed reserves, the funds rate often increased to exceptionally high levels In light of the continued imprecision in the borrowing relationship, the Desk pursued its borrowing objectives flexibly. When formulating its program for daily operations, it often emphasized current trading conditions in the federal funds market over estimated reserve needs associated with the borrowing allowance.

Extraordinary year-end funding pressures and reductions to reserve requirements had a significant impact on money markets and the Desk's operations in December. In an atmosphere of heightened financial fragility, and in keeping with ongoing efforts to improve capital positions, many banks strove to rein in the volume of lending that would be on their books on the end-of-year reporting date. At the same time, demands for funds spanning the turn of the year were high Dislocations occasionally emerged in the money markets as many institutions refrained from their customary arbitrage activities. Short-term interest rates, including the federal funds rate, were prone to considerable volatility. The reserve requirement reduction indirectly

[1]Money and debt growth rates cited in this report are based on data available on April 4, 1991 The money data incorporate the February 1991 benchmark and seasonal revisions, as well as subsequent revisions The benchmark revisions raised the growth rates of each of the three monetary aggregates by 0 2 percentage point over the four quarters of 1990

added to this volatility. Many banks, unaccustomed to working with such low reserve balances at the Fed, tended to manage their reserve positions very cautiously so as to reduce the risk of incurring overnight overdrafts or having to bid aggressively for funds late in the day. Demands for excess reserves in this climate ran high, although banks would sometimes seek to unload their reserve holdings in late-day trading once they felt confident of meeting their clearing needs. The volatility of the funds rate, resulting both from more cautious reserve management and from year-end funding needs, made it very difficult to gauge the underlying demands for reserves Toward the end of the year, the Desk sought to alleviate these pressures in the federal funds market by exceptionally aggressive provisions of reserves through open market operations.

The economy and interest rates

The pace of economic activity slowed dramatically in 1990, as a modest rebound in the rate of expansion early in the year gave way first to a period of generally sluggish growth and then to an economic contraction. Over the four quarters of the year, real GNP expanded just 0.5 percent, down from 1.8 percent in 1989 (Table 1). Growth in most sectors of the economy weakened to some degree during the year, while manufacturing and construction activity declined. Meanwhile, rapidly rising petroleum prices helped to lift overall inflation to levels not seen since 1981. Inflation excluding food and energy prices, or "core" inflation, was somewhat higher at the consumer level, but some other measures of underlying price and labor cost pressures showed no acceleration or decelerated over the year. Yields on investment-grade securities responded to the changing outlook for economic growth and inflation and the accompanying prospects for monetary policy Interest rates rose and then fell over the first half of 1990 as early indications of strengthening economic growth and heightened inflation gave way to signs of sluggish growth and more moderate price pressures. Surging energy prices pushed yields back up in late summer, especially for longer dated issues, but rates subsequently fell in the face of growing signs of a significant economic downturn and several steps to ease monetary policy. On balance, yields on Treasury coupon securities ended mixed, with shorter yields down as much as 70 basis points and the long bond yield about 25 basis points higher. Meanwhile, key bill rates ended the year about 100 basis points lower (Charts 1 and 2)

Sluggish growth and inflation worries—January through July

Early in 1990, the ongoing economic expansion, then entering its eighth year, appeared to be resilient Fueled by a modest rebound in final goods demand and boosted by a weather-related spurt in construction activity, real GNP in the first quarter rose 1 7 percent (annual rate), up from the sluggish 0.3 percent pace in the preceding quarter. At the same time, inflation was accelerating, although much of this pressure was expected to be short-lived because it resulted from the severe winter weather in December 1989 that pushed up the cost of fuel and some foods As measured by the fixed-weight price deflator, the inflation rate jumped to 6.6 percent in the first quarter from 3.8 percent in the previous quarter

Signs that economic activity was picking up while inflation was gaining some momentum helped push yields on many long-term Treasury issues to levels just over 9 percent by the end of April, up more than 100 basis points since the start of the year. Bill rates rose by lesser amounts to their highest levels for the year. Unexpectedly strong nonfarm payroll employment statistics were released in February and March, and other economic reports pointed to somewhat greater strength

Table 1

Changes in Key Economic Statistics

(Percent, Unless Otherwise Indicated)

Fourth quarter to fourth quarter	1990	1989
Real GNP	0 5	1 8
Final demand	1 5	1 6
Disposable personal income	–0 4	1 7
Consumer expenditures	0 1	1 2
Business fixed investment	2 2	4 5
Residential construction	–10 2	–7 1
Government purchases	3 4	0 6
Nonfarm inventories (billions of dollars)	–43 8	–11 9
Net exports (billions of dollars)	39 1	27 8
Fixed-weight GNP deflator	4 8	4 0
December to December		
Consumer price index, total	6 2	4 7
Consumer price index, excluding food and fuel	5 2	4 4
Producer price index, total	5 7	4 9
Producer price index, excluding food and fuel	3 5	4 2
Employment cost index	4 9	5 0
Average hourly earnings	3 7	4 1
Industrial production	–1 3	1 1
Nonfarm payroll employment, total	0 6	2 2
Employment, manufacturing	–3 1	–1 0

Notes GNP components and personal income are measured in constant dollar terms Final demand and government purchases are net of Commodity Credit Corporation purchases, which are treated as akin to changes in farm inventories

in the manufacturing sector than had previously been perceived.[2] Meanwhile, investors became more concerned about inflation prospects as price data began to reflect rising food and fuel costs and as the core component of the consumer price index (CPI) crept up These statistics helped to dispel expectations that the System would soon follow its December move with another easing step This perception was reinforced in late January by Chairman Greenspan, who expressed the view in congressional testimony that the current inflation rate was unacceptably high and that the recent slowdown in economic activity appeared to be only a "temporary hesitation." With the release in mid-April of the March CPI, which showed a disturbingly large jump in the index's core component, investor psychology shifted further and yields surged.

Rising interest rates abroad, particularly in Japan and Germany, added to the upward pressure on domestic yields early in 1990 by substantially narrowing the differential between foreign and domestic rates and by curbing the foreign appetite for U S securities. Higher yields abroad were largely the product of foreign countries' deteriorating inflation outlooks and tighter monetary policies, which, in the case of West Germany, were linked in part to the potential inflationary consequences of union with East Germany. Sharp declines in Japanese equity prices early in the year also helped to push U S. interest rates higher as foreign investors reportedly sold U S securities to mitigate their losses; however, some "flight-to-quality" demand for domestic securities was seen at times when foreign equity markets came under strong downward pressure.

Increased borrowing by the Treasury and sharply higher estimates of its future funding needs added to a negative market sentiment early in the year. A progressive deterioration in official deficit forecasts occurred throughout the year, in large measure reflecting a scaling back of projected economic growth and revised

[2]Employment data during the year were distorted by the temporary hiring of census workers Characterizations of the job data in this report are net of the impact of these workers

Chart 1

Long-Term and Short-Term Interest Rates

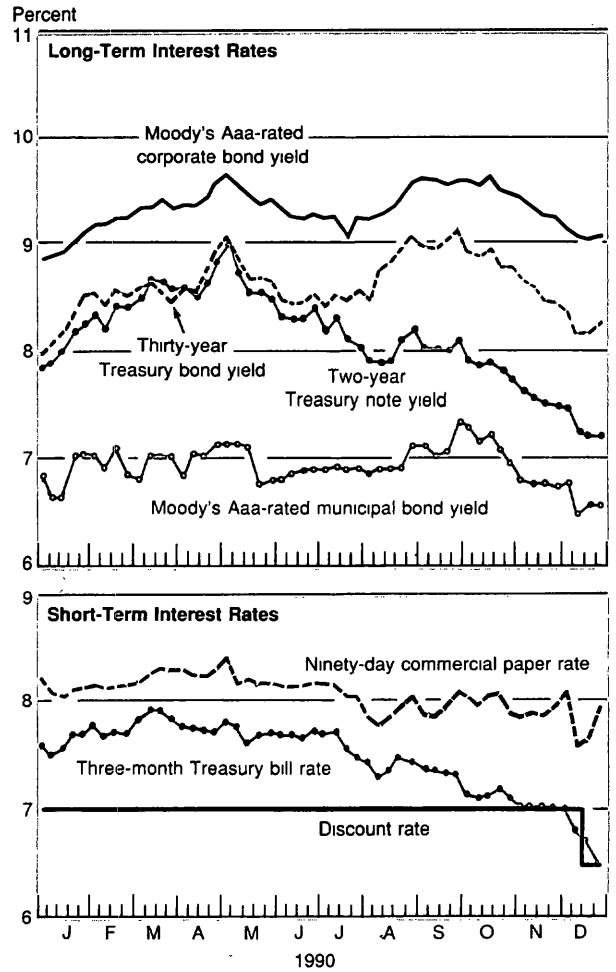
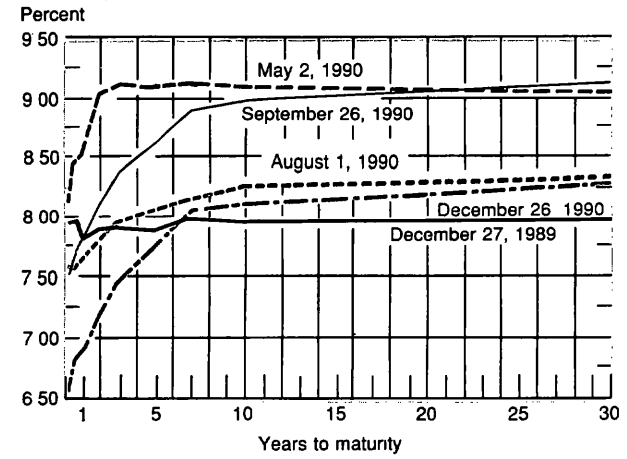


Chart 2

Yield Curves for Selected U.S. Treasury Securities



Notes Treasury bill yields are on a bond-equivalent basis
Coupon yields are constant maturity values

estimates of the costs of the savings and loan bailout.[3] Official projections of the final costs of the thrift bailout escalated to a range of $90 billion to $130 billion (in present value terms), well above the $50 billion originally allocated by the Congress for this task. Estimates of the "working capital" needs of the Resolution Trust Corporation (RTC), the agency charged with disposing of failed thrifts, also grew, and in February the agency began to raise funds by borrowing from the Federal Financing Bank, a move that resulted in increased Treasury borrowing from the public. In a related development, the Resolution Funding Corporation (REFCORP), the borrowing agency authorized to raise a total of $30 billion to pay for thrift losses, borrowed $8½ billion in auctions of forty-year bonds in January and in April, and both auctions fared poorly. (Later auctions of thirty-year REFCORP bonds were better received.)

During the middle of the year, economic growth was uneven, but slower on balance than in the early months of 1990. The real economy expanded at about a 1 percent annual rate during the middle two quarters, with somewhat slower growth coming in the second quarter. Inflation moderated in the spring and early summer as food and fuel cost pressures eased, and there was little evidence that the upsurge in these costs earlier in the year was having an impact on core inflation.

Accumulating evidence of lower growth and slower inflation put interest rates on a declining trend, and by the end of July many longer term rates were just a bit above, and shorter term rates somewhat below, the levels prevailing at the start of the year. Yields had moved sharply lower following the release of an unexpectedly weak jobs report in early May, and smaller than expected changes in the producer price index (PPI) reported soon afterwards alleviated inflation worries. Subsequent economic reports confirmed that a slowdown was underway and virtually eliminated any speculation that monetary policy would be tightened in the near future. Another weak employment report released in June encouraged talk of a possible recession, stirred expectations of a Fed easing, and pushed yields even lower; however, later economic reports provided a more mixed assessment of the pace of the expansion, and the core inflation rates in the PPI and CPI reports released in June were seen as too high to permit an easing move.[4]

Accordingly, many investors were surprised when Chairman Greenspan intimated in congressional testimony on July 12 that the Fed would relax reserve pressures, a step that was implemented by the Desk on the following day. Some were unconvinced by the reason given for the move—to help offset a recent modest tightening of credit availability. Chairman Greenspan's Humphrey-Hawkins testimony, delivered the following week on the same morning that an unexpectedly big jump in the CPI was announced, did not dispel these doubts and left many participants concerned that monetary policy was moving toward further ease just when inflation appeared to be gaining momentum. Consequently, while rates on many shorter maturity issues moved lower on the easing move, longer term yields held steady or moved a bit higher.

Budgetary developments continued to affect financial markets during the spring and early summer. Growth in Treasury borrowing, in part to finance an accelerated pace of RTC activity, underscored a deteriorating budget outlook. Formal negotiations for a multiyear budget package began in mid-May, and in June President Bush announced that tax hikes would be part of any credible budget package. Hopes were raised that significant deficit cuts could be realized, lowering the Treasury's prospective borrowing needs and possibly paving the way for an easing move by the Fed to offset fiscal restraint. Chairman Greenspan directly linked a monetary policy move to a budget pact in his July Humphrey-Hawkins testimony when he indicated that the System might reduce reserve pressures if "major, substantive, credible cuts in the budget deficit" were achieved. Interest rates, especially those on short-term Treasury securities, eased on these developments; however, little progress was made in budget negotiations before the summer recess, and most investors remained skeptical of the prospects for significant deficit reductions.

Persian Gulf crisis and declining economic activity—August through December

The surge in oil prices that followed the Iraqi invasion of Kuwait in August raised the prospect of rapidly escalating inflation and generally clouded the economic outlook. Yields on longer term securities shot up quickly, and the Treasury yield curve steepened dramatically, in part because many participants sought the relative safety of shorter term securities. Moreover, in the aftermath of the invasion, trading conditions were quite vol-

[3]The ultimate implications of growing deficits for interest rates are complex Extra Treasury borrowing brought on by slowing economic growth normally is accompanied by reduced credit demands from other sources Moreover, if funds borrowed to pay for deposit insurance losses and the Resolution Trust Corporation's working capital needs are recirculated in financial markets, as is generally assumed, then the funds available to other borrowers would not be reduced and there would be little impact on interest rates apart from dislocations brought on by new funding patterns

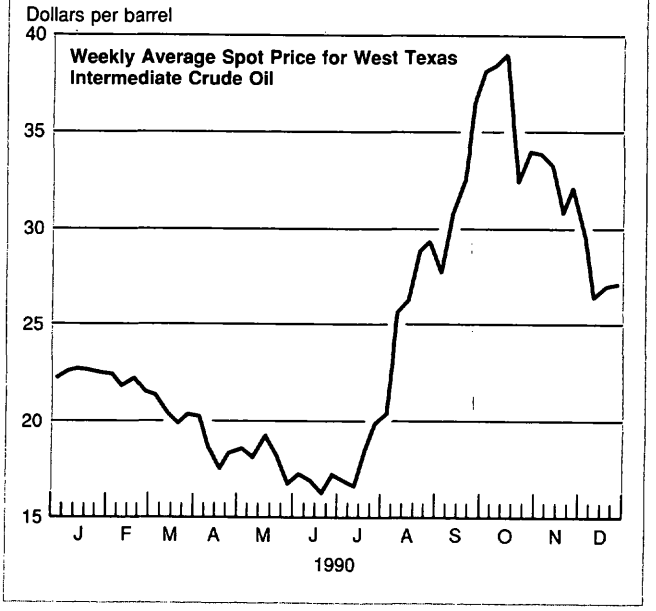
[4]Several payroll employment reports, including some released in the spring and summer, showed large revisions to previously released data These revisions sometimes altered perceptions formed by the initial release

atile, with prices for oil and long-term securities often moving sharply on rumors or reported developments relating to the Persian Gulf crisis. This volatility, and the close association between movements in oil prices and long-term rates, eventually moderated but remained a feature of trading for the rest of the year Petroleum prices peaked in October around $40 per barrel for some grades of oil, but prices soon fell back as fears of an immediate outbreak of hostilities abated and as investors became assured that the shortfall left by the embargo on Iraqi and Kuwaiti oil would be filled by higher output elsewhere (Chart 3)

In the weeks following the invasion, financial market participants were uncertain about the course of monetary policy. Accumulating evidence that economic activity was slowing and concerns over the impact of a sustained rise in oil prices on consumer spending and business investment generated speculation that an easing of policy could occur in the not too distant future. This perception helped limit the upward movement in rates on shorter term instruments. At the same time, however, the System was seen as being constrained by the rapid run-up in oil prices and as preferring to wait until the turmoil in financial markets abated before making any policy move. Other price data available in August and September added modestly to a deteriorating inflation outlook, and in September, a stronger than expected employment report largely dispelled the view that policy would soon be eased to spur growth.

Chart 3

Petroleum Prices



Investors monitored the course of budget talks in late summer and early fall, and interest rates often moved inversely with the degree of optimism about the course of negotiations. In early September, President Bush reiterated his goal of achieving significant cuts in a multiyear package and Chairman Greenspan again tied a possible easing in policy in part to the adoption of a credible and enforceable agreement, but hopes for achieving such an agreement dimmed as budget negotiations dragged on On September 30, budget negotiators reached an accord on a plan to cut future deficits by a cumulative $500 billion over five years and to provide several new enforcement mechanisms, and the plan was termed "credible" by Chairman Greenspan. On October 4, however, the House of Representatives rejected the proposal A reformulated accord, which was similar in many respects to the earlier agreement, was reached on October 27 It was soon ratified by the Congress and followed by an easing move by the Fed.

The economy began to turn down in the second half of the year, a contraction brought on to an indeterminate degree by the rise in oil prices and the uncertainty over the future course of events in the Middle East. Real GNP in the final quarter dropped 1.6 percent (annual rate). The manufacturing sector—particularly auto production—was hard hit, but many service industries weakened as well Businesses, however, were keeping their inventories trim (final demand actually posted a slight gain in the final quarter) Exports also remained a bright spot Pressures on core prices showed some tendency toward moderation in the fourth quarter, but total inflation remained elevated because of higher energy prices.

Interest rates moved steadily lower during the final two months of the year as investors increasingly accepted the view that the U.S. economy had entered into a recession and as the System took several steps to spur growth Many long-term yields again fell to levels not far above those prevailing at the start of 1990, while shorter term yields dropped to their lows for the year A weak employment report in early November was soon followed by a move to ease policy Yields fell dramatically on December 7 on news of huge job losses in the previous month and big downward revisions to October's employment levels, and the Fed eased later that day Meanwhile, evidence of some moderation of core inflation was seen in the monthly PPI and CPI reports released in November. Actions by the Board of Governors in December to eliminate some reserve requirements and to lower the discount rate, as well as another easing move by the FOMC, added momentum to the downward move in rates and convinced most investors that the System was prepared to act aggres-

sively to support a faltering economy.

Debt issuance

The Treasury's financing needs continued to grow in the latter part of the year. The size of its regular weekly bill auctions rose steadily to a record $20 billion in the final quarter—a rise that was only briefly interrupted in October when the Treasury exhausted its remaining borrowing authority under a temporary debt ceiling. The size of the midquarter refunding also reached a record level of $34 billion in November. For the year as a whole, the Treasury issued a net $232 billion in new marketable debt (including over $50 billion to raise RTC "working capital"), compared with $123 billion in 1989.[5] Meanwhile, REFCORP borrowed $18½ billion during the year, exhausting all but $7 billion of its remaining borrowing authority (which it used up in January 1991).

In other markets, public debt offered by U.S. corporations in the domestic bond market rose 3.6 percent, reversing a three-year decline, as a large jump in asset-backed issuance helped offset the virtual disappearance of new speculative grade offerings.[6] With many municipalities struggling to cover budget gaps brought on by a slowing economy, borrowing by state and local governments picked up 5.9 percent. Borrowing in both the corporate and tax-exempt markets was concentrated in the middle and the end of the year, when interest rates were at their lowest. Yields on top-rated corporate and tax-exempt offerings generally moved in line with those on comparable Treasury securities, although often with some lag.

Financial market strains

Monetary policy in 1990 was conducted amid a heightened sense of financial fragility. A worsening economic climate and higher energy costs directly undermined the financial health of many companies, but in the view of many analysts, a root cause of the financial difficulties that surfaced or intensified in 1990 was the buildup in debt over the past decade that had left firms increasingly vulnerable to an economic downturn.[7] One of the clearest overall indications of mounting pressures during the year was the sharply increased number of companies whose debt was downgraded. According to Moody's Investor Service, total corporate downgrades outnumbered upgrades by nearly 4.5 to 1, up from a ratio of 2.5 to 1 in 1989.[8] (In 1982, during the last recession, this ratio was 2.8 to 1). The "quality spread," or difference in yields paid by the highest and lowest rated investment grade corporate issuers, also trended up (Chart 4). Hardest hit were financial institutions; downgrades in this sector by Moody's outnumbered upgrades by more than 8 to 1 in 1990.[9] The savings and loan industry continued to shrink as a result of problems that had come to light years earlier; during 1990 over 400 thrifts closed or merged. Meanwhile, difficulties emerged elsewhere in the financial system, particularly among bank holding companies.

Developments in the market for speculative debt

The problems that in 1989 beset the market for below-investment-grade securities, sometimes called "high-yield" or "junk" bonds, intensified in 1990. As the year began, this market was already under pressure from a sluggish economy that aggravated the interest payment burden of many highly leveraged issuers of junk debt. Pressures grew in late January when Allied Stores and Federated Department Stores, two subsidiaries of Campeau Corporation whose difficulties had sparked a general sell-off in the high-yield market in September 1989, filed for bankruptcy protection. That same month, ratings were lowered on almost $20 billion of outstanding high-yield debt issued by RJR Nabisco, a company whose debt had been viewed relatively favorably.[10] Then, in February, the Drexel Burnham Lambert Group, a major underwriter and holder of junk debt, filed for bankruptcy. This action came after the firm began to face difficulties attracting funding for its operations.[11] Although rumors of Drexel's impending demise had been circulating for some time, many junk bond yields still rose upon the announcement. Investors were con-

[5]These figures are for calendar years The federal government's budget deficit in fiscal year 1990 was $220 billion, up from $153 billion in the previous year and just shy of the record $221 billion deficit in fiscal year 1986.

[6]Data on corporate and municipal debt issuance were supplied by the Board of Governors of the Federal Reserve System.

[7]Between 1979 and 1989, the ratio of outstanding debt of all domestic nonfinancial sectors to the level of GNP rose from 1 35 to 1 82

[8]The totals include ratings changes for industrial and financial companies and for investor-owned public utilities. Total downgrades numbered nearly 450 in 1990, up from nearly 350 in the previous year

[9]The financial sector includes banks, thrifts, insurance companies, and other financial institutions. There were about 150 downgrades by Moody's in 1990 and under 20 upgrades.

[10]This move by Moody's followed a similar step taken by Standard and Poor's the previous July

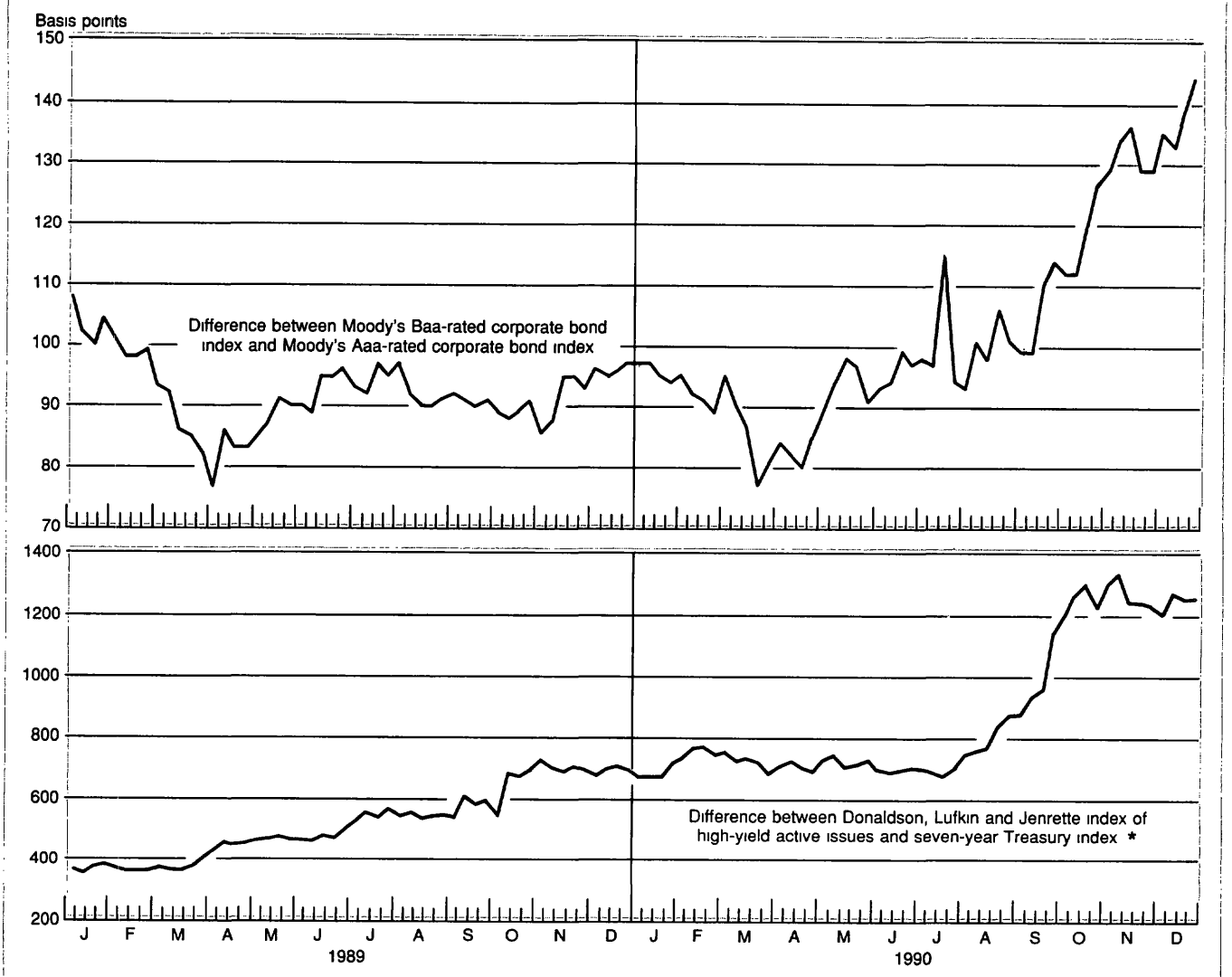
[11]The Federal Reserve Bank of New York was heavily involved in coordinating an orderly winding down of the operations of Drexel's government securities subsidiary, a primary dealer Additional information on the System's response to the collapse of Drexel is contained in the testimony of Chairman Greenspan before the Subcommittee on Economic and Commercial Law of the House Committee on the Judiciary on March 1, 1990, reprinted in the *Federal Reserve Bulletin*, May 1990

cerned not only about the impact of disposing of Drexel's considerable holdings of junk bonds but also about the functioning of the market for high-yield debt following the collapse of its biggest market-maker The prospect of large divestitures of junk bond holdings by thrifts attempting to restructure and by the RTC, which acquired its holdings from seized thrifts, also weighed on the market over the first half of the year

Despite these developments, a number of factors helped to calm the market for junk bonds over the next several months. New issuance was nil. Several companies announced plans to recapitalize or restructure their outstanding high-yield debt through corporate "buybacks," further alleviating supply pressures and generally helping to restore investor confidence. Furthermore, the RTC reassured investors that it would pursue an orderly, long-term liquidation of its high-yield holdings Finally, the growing popularity of collateralized bond obligations—in this case, securities derived from pools of junk bonds that diversify risk—added liquidity to the

Chart 4

Yield Spreads



* Provided by Donaldson, Lufkin and Jenrette

market According to one measure, the spread between yields on junk bonds and those on Treasury securities widened modestly in February but, on balance, was about unchanged during the first half of the year (Chart 4).[12]

The market for high-yield debt deteriorated dramatically following the Iraqi invasion of Kuwait. Rising fuel costs were expected to depress earnings of transportation-related companies, especially airlines, many of which had large amounts of junk bonds outstanding. Growing concerns over an economic downturn pushed yields sharply higher on bonds issued by firms in cyclically sensitive sectors of the economy, notably some retailers and casino operators. Some of the biggest jumps in junk bond yields came amid eroding equity prices and extremely illiquid trading conditions A number of affected companies filed for bankruptcy during the last few months of the year, and more saw their outstanding debt downgraded. The spread between the index of yields on junk bonds and corresponding Treasury securities about doubled over the year, after having doubled in 1989. According to the Bond Investors Association, eighty-nine issuers defaulted on about $25 billion of speculative debt in 1990; in the previous year, fifty-seven issuers defaulted on about $12 billion, and in 1988 thirty-seven issuers defaulted on under $5 billion.

Credit developments in the banking system

The financial position of many bank holding companies deteriorated markedly in 1990 as a soft economy jeopardized the value of assets carried on the balance sheets of their bank subsidiaries In particular, a depressed real estate market in parts of the country placed tremendous strains on the many banks that had aggressively extended credit for construction activity and related commercial projects over the past several years. Loans granted to companies that were highly leveraged with below-investment-grade debt also came under pressure as junk bond prices plummeted. These developments compounded the difficulties of some banking institutions burdened with problem loans extended years earlier to less developed countries

As 1990 began, the problems of bank holding companies were most apparent in the Northeast, particularly in New England, a region that had seen some of the most spectacular growth in property prices in the 1980s but was now experiencing a depressed real estate market. Several of the larger regional banks in the area reported sizable losses and additions to loan-loss reserves, for the most part stemming from soured construction-related loans. The credit ratings on the debt of many bank holding companies in the region were downgraded during the year, and yield spreads on their outstanding debt widened significantly, in some cases reaching "distressed" levels. In January, one of the most seriously affected, and largest, banks in the region, Bank of New England, began to borrow from the discount window After it became clear that the bank's difficulties would not be quickly resolved, its borrowing was classified under the extended credit program. Soon afterwards, federal regulators issued orders requiring the holding company's main banking subsidiary to improve its capital position, and the bank embarked on a major effort to shed a sizable portion of its asset holdings.[13]

Problems confronting banks throughout the country worsened as the year progressed, most visibly for many of the nation's money center banks Banks' profitability during the year suffered from deteriorating loan portfolios. Partly as a result, ratings on the outstanding debt of many bank holding companies were lowered. The downgradings mostly affected longer term debt, but ratings on some commercial paper and other short-term liabilities were lowered as well. Yield spreads on much of this debt widened considerably in expectation of or soon after these moves. Bank stock prices were on a downward course during most of the year.[14]

Negative sentiment toward the banking sector intensified in late summer. In September, two government agencies issued reports highlighting the fragility of the banking system. About the same time, Chase Manhattan Corporation encountered a much higher than expected rate on the auction repricing of some of its outstanding notes. Shortly thereafter, Chase announced far-reaching cost-cutting efforts, a reduction in the stock dividend, and a sizable addition to the bank's loan-loss reserves. These events were seen as symptomatic of industry-wide difficulties, and in fact they were soon repeated at several other large holding companies. In this environment, yields on much bank holding company debt soared—with spreads over comparable Treasury issues widening as much as 200 basis points in a matter of days for some of the most affected institutions. Demand for Treasury bills as a safe haven materialized when concerns over the health of the banking system were greatest. The pressures on many banks moderated a bit towards the end of the year, but investors remained uncertain about the financial position of many banks. Consequently, some banks report-

[12]The spread is based on indexes provided by Donaldson, Lufkin and Jenrette

[13]The bank's extended credit borrowing ended in June The bank was eventually seized by the Federal Deposit Insurance Corporation in January 1991

[14]The unweighted average of stock price changes for thirteen of the nation's largest bank holding companies fell 40 percent for all of 1990

edly had greater difficulty attracting deposits.

Banks responded to the increased financial strains they faced with some retrenchment in their loan activity. The volume of lending typically slows when an economy turns down because the demand for credit dries up and banks become more cautious in lending to borrowers whose ability to repay has fallen. However, in 1990, indications gradually accumulated suggesting that many banks had cut back on the availability of credit even to creditworthy borrowers, a development that was popularly characterized as a "credit crunch."[15] To some degree this retrenchment was evidenced by commercial banks' reluctance to assume all the lending activity left by a shrinking savings and loan industry. Although the extent to which banks had deliberately reduced their willingness to supply credit remained unclear, the possible impact of such a cutback on the economy was a growing consideration in the Federal Reserve's formulation of monetary policy during the year.

Early in the year, evidence that banks had become more cautious in extending or renewing credit was mostly anecdotal. Highly leveraged borrowers and nonresidential real estate developers in areas with significant inventories of unsold properties were said to be particularly affected. Also mentioned were many small- and medium-sized businesses—most of which lacked direct access to credit markets. Banks reportedly were responding to the growing uncertainties associated with lending for certain types of activities and to what they perceived as a greater stringency on the part of banking examiners in the evaluation of loan portfolios. Furthermore, many banks felt constrained in granting new loans by the scheduled application of tighter capital standards, especially at a time when problems with their existing loan portfolios were spreading. In this environment, many banks reportedly discouraged all but their most creditworthy customers from borrowing, either by directly limiting access to funds or by charging higher rates. The higher funding costs that banks themselves faced as the year progressed exacerbated this trend. Although direct evidence of a squeeze on credit remained fragmentary, from midsummer through the rest of the year the pervasive sluggishness in the monetary aggregates and the results of various lending surveys increasingly suggested that banks had become more reluctant to lend. Partly because of a reduced desire to extend new credit, as well as concerns about their year-end balance sheets, banks held off lowering their prime lending rates—despite generally declining market yields—until early 1991.

[15]The term "credit crunch" has often been used to describe a situation in which binding interest rate ceilings on deposits reduce banks' ability to attract funds and thus their capacity to lend, a situation which did not exist in 1990.

The money markets and year-end

In an atmosphere of increased credit concern, many borrowers encountered growing difficulties obtaining short-term financing in the commercial paper market. The downgrading of Chrysler Financial Corporation's commercial paper in June—to A3 by Standard and Poor's and to P3 by Moody's—served as a catalyst in focusing investor attention on the credit risks in this market in a slowing economy. Many financial companies found it more difficult to place their paper as their financial problems received increased attention. The exposure of money market mutual funds as major holders of commercial paper came under some scrutiny during the year, and the Securities and Exchange Commission put forth a proposal to limit these funds' holdings of less than top-rated paper.[16] In this environment, quality spreads—yield differences between issues with different ratings—widened, and some borrowers were forced to seek alternative, sometimes more costly, sources of short-term financing.

The funding pressures that typically arise in money markets towards the year-end as institutions adjust their balance sheets for that important reporting date were aggravated in 1990 by these financial market strains. Corporate borrowers, cut off from alternative sources of short-term financing, increasingly turned to their committed credit facilities at banks. At the same time, however, many of these banks were discouraging new borrowing as they sought to improve their capital positions before the year-end statement date by constraining their balance sheets. In addition, with credit concerns rising, many lenders were pulling back on their credit lines to certain borrowers, including credit lines to many domestic banks, and some institutions were refraining from their customary arbitrage activities, creating some dislocation in the money market. Meanwhile, many banks were wary of borrowing at the discount window even for routine adjustment credit lest their borrowing somehow become known to the public and be misinterpreted as a sign of fundamental problems. Thus, adjustment credit borrowing from the discount window lost some of its value as a safety valve when pressures intensified.

The high demands of many branches and agencies of Japanese banks operating in the United States added to the year-end distortions. Like their U.S. counterparts, many Japanese banks faced growing strains in 1990 as plummeting equity prices and a sagging real estate market at home depressed their asset holdings just as they were struggling to comply with tighter capital

[16]This proposal was adopted with some modifications in February 1991, but most money funds had begun to adjust their portfolios to conform to its provisions before then.

standards. During the year, credit ratings of many Japanese banks were reduced by the U.S. ratings agencies. Larger Japanese banks that traditionally provided credit to regional Japanese banks cut back on this lending, forcing some borrowers out of the yen-denominated market in search of alternative funding for the year-end. At the same time, credit-sensitive U.S. lenders, particularly regional institutions that were less familiar with Japanese institutions, cut their own credit lines to these borrowers. Other lenders often declined to fill this funding gap, despite the profitable opportunities that occasionally emerged, because they wished to keep their balance sheets from expanding or to avoid carrying Japanese names on their books over the year-end.

In these circumstances, demand for funds covering the year-end emerged sooner than usual. Japanese institutions in particular were early, active borrowers of both term monies and forward two-day Eurodollars and federal funds. The dislocation in normal funding patterns also contributed to an upsurge in volatility of the federal funds rate, which swung from elevated levels to extreme lows on some days.[17] The Desk acted aggressively to alleviate these pressures—particularly in late December—by providing reserves through open market operations. Relative calm returned to the money markets with the passing of the year-end, but many of the elements that contributed to these extraordinary funding pressures remained.

The monetary aggregates

Growth of the broader monetary aggregates, M2 and M3, decelerated in 1990 (Chart 5). Early in the year, M2 and M3 continued to advance in line with growth in the latter half of 1989. In the spring, however, a pervasive weakness emerged that was to last for the remainder of the year, except for a spurt of growth in late summer. Overall, M2 and M3 increased 3.9 percent and 1.7 percent, respectively, from the fourth quarter of 1989 to the final quarter of 1990. These rates of expansion left both aggregates in the lowest quarter of the FOMC's annual target growth cones at the end of the year. Growth of total domestic nonfinancial debt in 1990 was somewhat below the previous year's pace. Total debt expanded fairly steadily throughout the year, supported by a high rate of expansion in federal government borrowing. It rose 6.8 percent overall and finished slightly below the midpoint of its monitoring range. Meanwhile, after growing anemically in 1989, M1 grew a modest 4.2 percent in 1990. Boosted by exceptionally strong currency growth, M1 growth was in line with the pace of expansion set in the second half of 1989.

The ongoing restructuring of the savings and loan industry depressed growth of the broader aggregates, and especially M3, to a greater extent than had been anticipated at the start of the year because of the unexpectedly strong pace of the RTC's restructuring activity. Much of this activity came in the late spring and early autumn. The downsizing of the savings and loan industry resulted primarily in a switching of deposits—out of thrifts and into other depositories—which by itself has no impact on the aggregates; however, some of the deposits of dissolved thrifts, especially managed liabilities, were reinvested in instruments not included in the monetary aggregates.

At the same time, commercial banks' funding requirements fell as their lending diminished. A slumping economy and more cautious lending behavior on the part of banks whose financial positions had deteriorated contributed to this decline in lending activity. The resulting weakening of the broader aggregates was viewed by the Committee with increasing concern. As banks cut back on their asset expansion, the gap between market interest rates and yields on banks' retail deposits widened beyond the average that had prevailed in the mid-to-late 1980s. The slowdown in M3 was more pronounced than that for M2 because many banks substituted cheaper and more stable retail deposits, which are included in M2, for more expensive and volatile time deposits and other managed liabilities found in M3. The strength of noncompetitive tenders at Treasury auctions during the year suggested that some of the funds leaving both banks and thrifts found their way into the government securities market.

In February, the FOMC reaffirmed the 1990 target range for M2 that had been tentatively established the previous July and that called for growth of 3 percent to 7 percent—the same range that had been set for 1989. The Committee lowered the target range for M3 to allow for the anticipated shrinkage of the thrift industry. The new range encompassed growth of 2½ percent to 6½ percent for M3 in 1990, compared with the tentative range established the previous July (and the 1989 range) of 3½ percent to 7½ percent. The 1990 ranges were considered consistent with sustained economic growth and the FOMC's continued commitment to price stability. The Committee maintained the width of its ranges for M2 and M3 at 4 percentage points, as it had done since 1988, because the rate of monetary growth associated with an acceptable economic performance remained subject to considerable uncertainty. In addition, the behavior of M3, and to a lesser degree M2, was rendered less predictable because of the uncertainty about the effects of thrift restructurings. These ranges were also expected to provide the Committee with

[17]The cut in reserve requirements made late in the year also contributed to an increase in the volatility of the federal funds rate (See the discussion of the Desk's December operations below.)

Chart 5A

M2: Levels and Target Ranges

Cones and Tunnels

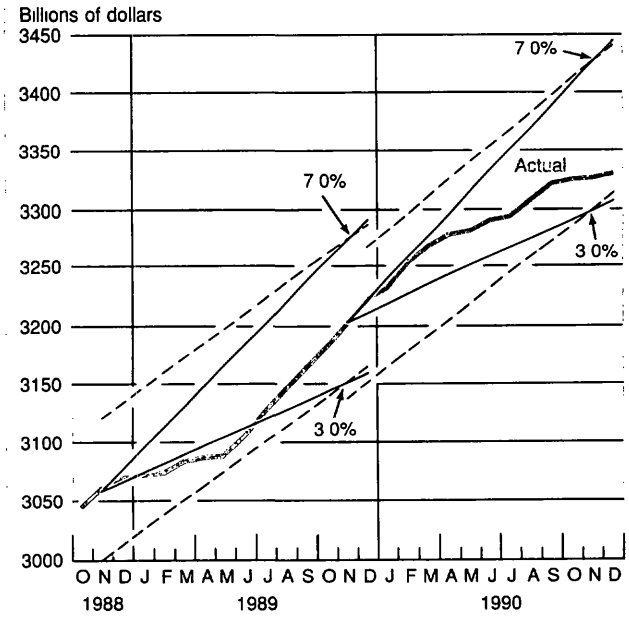


Chart 5B

M3: Levels and Target Ranges

Cones and Tunnels

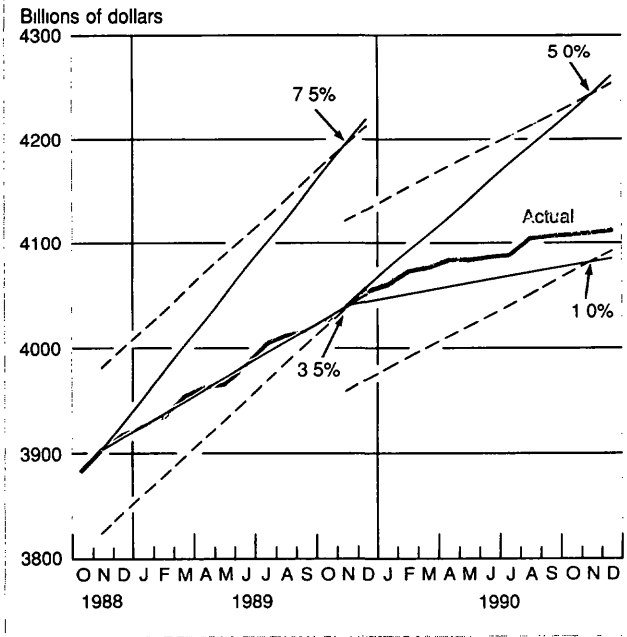


Chart 5C

Total Domestic Nonfinancial Debt: Levels and Monitoring Ranges

Cones and Tunnels

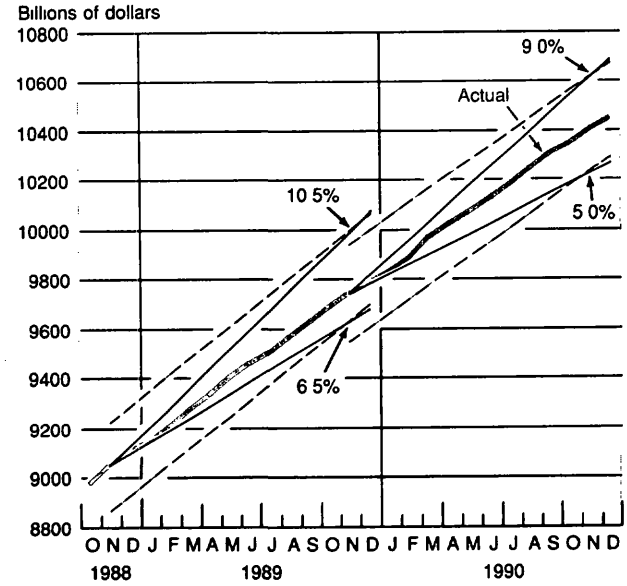
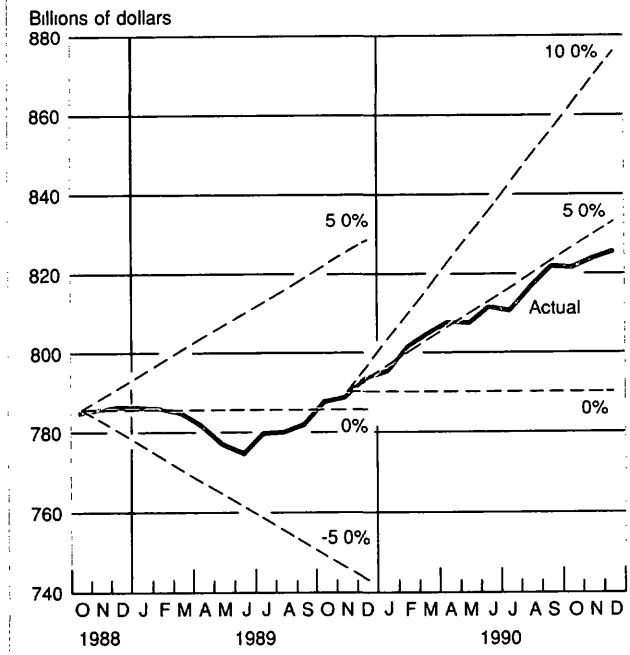


Chart 5D

M1: Levels and Growth Rates



ample leeway to pursue a more aggressive policy to restrain inflation should price pressures intensify. The Committee continued to evaluate money growth in light of progress towards price stability, movements in velocity, and developments in the economy and financial markets.

The FOMC set a monitoring range for total domestic financial debt growth of 5 percent to 9 percent, below the tentative 6½ percent to 10½ percent range established the previous July and the range for 1989. The range was lowered because corporate merger and acquisition activity and household debt growth were expected to diminish—prospective developments welcomed by the Committee in light of existing debt burdens. Meanwhile, for the fourth consecutive year no growth range was set for M1 because the relation between that aggregate and nominal GNP remained very uncertain.

During the first half of 1990, M2 growth decelerated a bit from the pace maintained late in the previous year. Early in the year, however, strength in transaction and other liquid accounts and a surge in currency—much of it apparently destined to go overseas—helped push this aggregate close to the top of its growth cone. Then, during the spring, M2 growth was gradually curbed by the rising opportunity costs of holding M2 balances, particularly money market mutual funds (MMMFs). A steeper yield curve reduced the attractiveness of rates on these funds compared with yields on competing Treasury securities of somewhat longer maturity. (Weakness in MMMFs may also have been a reaction to a rallying stock market, as evidenced by strong flows into equity mutual funds.) Rates on retail deposits, particularly certificates of deposit (CDs), were unusually slow to respond to the rise in market interest rates through April, further depressing M2 in the first half of the year. Still, M2 advanced at an average rate of 5.1 percent over the first two quarters.

Growth in M3 over the first half of the year came solely from M2; its non-M2 component fell dramatically. Declines were most evident in large time deposits. The fall in thrift time deposits had been expected; however, the declines seen at commercial banks were unanticipated because banks had been expected to pick up enough of the thrifts' loan business to have sought additional financing through large time deposit issuance. The weakness at commercial banks was attributed to the slackening pace of economic expansion and, increasingly, to banks' growing reluctance to lend. M3 expanded at a 2.1 percent annual rate over the first two quarters of 1990. Meanwhile, M1 grew at a 4.8 percent pace during this time, partly as a result of the strong currency growth; and debt rose at a 6.8 percent rate, buoyed by growing Treasury borrowing, some of which was used to fund the RTC's activities.[18]

At its midyear review of the growth ranges for the broader monetary aggregates and debt, the FOMC set a new, lower range for M3 in 1990 of 1 percent to 5 percent. This move reflected the weakness in M3 to date, as well as expectations of continuing thrift resolution activity by the RTC and moderate expansion of commercial bank credit. These factors were expected to affect M2 to a much lesser degree, and the growth range for this aggregate was retained in July, as was the monitoring range for debt.

Growth in the broader aggregates tapered off even further in the second half of the year, despite a brief jump in the aftermath of the Iraqi invasion of Kuwait. At that time, MMMFs surged as investors fled the uncertainty and volatility of equity and bond markets, and currency sharply increased, in large part because of demands from the Middle East. Growth in currency and MMMFs decelerated by November, however, and the earlier weakness in the broader aggregates reemerged. The accelerated slippage in the economy, and perhaps to some degree, growing difficulties of banks in attracting funds as anxieties about their financial health deepened, aggravated the weakness in M2 and M3. Growth in small time and savings deposits remained sluggish late in the year despite declines in the opportunity costs of holding these deposits. The weakness in M2 was fairly broad-based, and the managed liability component of M3 shrank. Meanwhile, M1 growth remained robust in the second half of the year as a result of the late summer surge in currency growth.

The drop in deposit liabilities associated with the restructuring of the thrift industry and with banks' restrained lending behavior contributed to a significant 2.7 percent advance in the income velocity of M3 that extended the recent pattern of increases but ran counter to the declining long-run trend (Chart 6). The drop in liabilities also helped bring about a lesser, 0.6 percent, rise in the velocity of M2. Both increases were well above the aggregates' respective average rates of velocity growth for the period 1982-90 but not much different from the gains registered in 1989. Meanwhile, the income velocity of M1 was up a scant 0.3 percent in 1990, an increase well below the previous year's rapid 5.0 percent advance. The velocity for domestic nonfinancial debt fell 2.1 percent, in line with recent yearly declines.

The course of policy

During 1990, the FOMC responded to economic and

[18]Growth rates of M1 and M2 in the first half of the year were revised upward modestly by the benchmark and seasonal factor revisions. For the second half of the year, these revisions led to minimal changes in the growth rates of both aggregates, but M3 growth was raised modestly

Chart 6A

M2 Velocity Growth

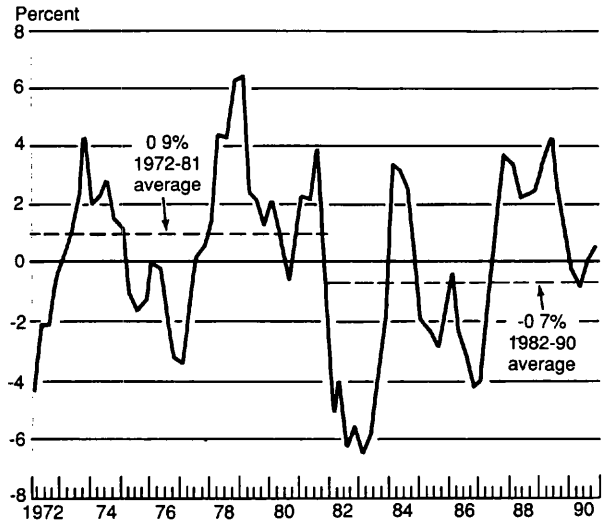


Chart 6B

M3 Velocity Growth

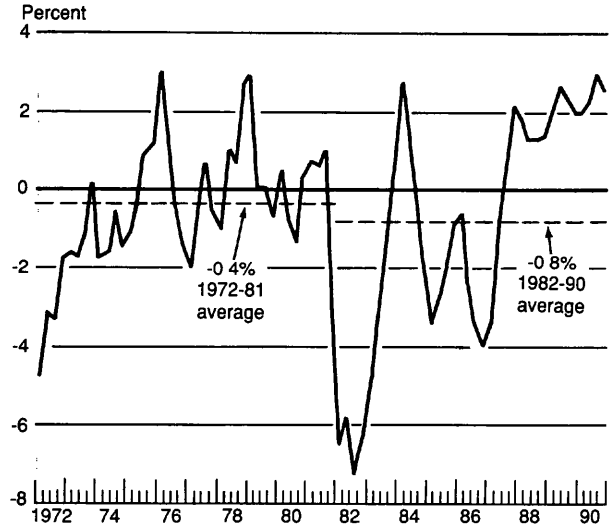


Chart 6C

Total Domestic Nonfinancial Debt Velocity Growth

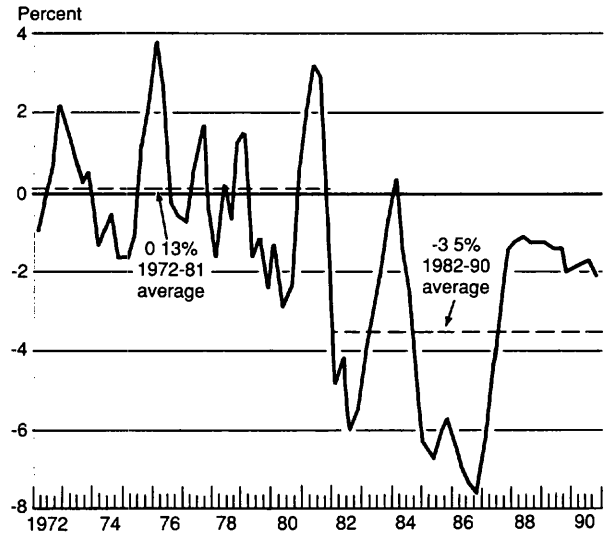
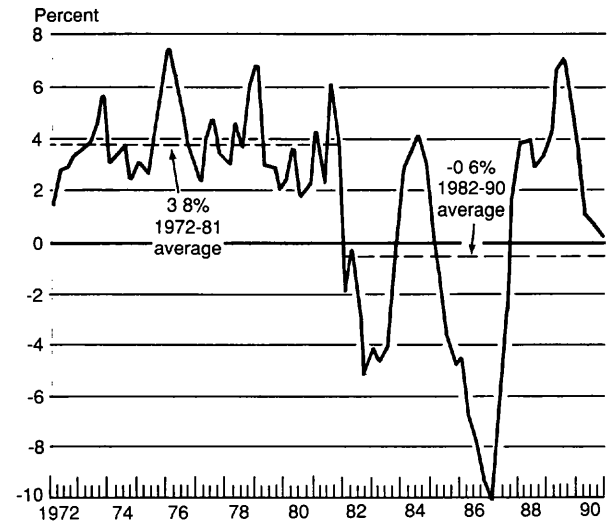


Chart 6D

M1 Velocity Growth



Notes Velocity growth is measured from four quarters earlier Shaded areas represent periods of recession as defined by the National Bureau of Economic Research

financial developments by continuing the gradual easing of reserve pressures it had initiated in mid-1989. Following a move to ease reserve pressures in mid-December of 1989, the Committee's policy stance remained unchanged for nearly seven months because the risks of inflation and an economic softening were seen as about evenly balanced.

By mid-July, however, the risks appeared to be weighted in the direction of weakness in economic activity. Although the trend rate of inflation had shown no signs of improvement, progress toward reducing this rate was anticipated because the monetary aggregates had grown at moderate rates for an extended period and economic expansion was expected to continue at a pace below its potential. Meanwhile, indications such as a marked slowing in monetary growth in the second quarter suggested that credit conditions had become tighter than appropriate. To offset this unintended degree of restraint, reserve pressures were eased slightly on July 13.

The outlook for the economy and prices was not much changed just prior to the Iraqi invasion of Kuwait; however, the invasion and subsequent surge in oil prices introduced considerable uncertainty into the longer term prospects for both economic activity and inflation. In these circumstances, the Committee felt that it could best contribute to the nation's economic goals by fostering a stable policy environment. It therefore left reserve pressures unchanged following its August meeting, but it remained disposed toward ease.

The Committee took its second accommodative step in late October. When it met early in the month, evidence pointed to a significant risk of a much weaker economy, and protracted federal budget negotiations had recently produced a tentative accord that incorporated a significant degree of fiscal restraint. Chairman Greenspan was on record as declaring the agreement "credible," an assessment he had identified as a precondition to easing policy. In view of widespread market expectations that an easing would follow a budget pact, Committee members thought that an immediate easing could give rise to expectations of a further move once the package was enacted. Consequently, the FOMC decided to delay implementing its accommodative move until the budget agreement was approved. At that point, the enactment of a budget was thought to be imminent; however, the Congress rejected the original budget agreement. The easing did not occur until October 29, after a somewhat revised package was passed.

The Committee stepped up its pace of accommodation in November and December, easing its policy stance three times. Evidence received during this period indicated that a downturn in economic activity had begun and that financial conditions remained fragile. While the contraction was expected to be mild and brief, the uncertain condition of many financial institutions and a curtailed supply of credit to many borrowers contributed to a risk that the downturn might be more severe or prolonged. Moreover, money growth slowed further, and underlying inflation pressures were expected to moderate somewhat. In these circumstances, the Committee eased reserve pressures following its November meeting and carefully monitored the incoming information for signs that additional accommodation would be appropriate. Data received in early December confirmed that additional easing steps were called for, and the Committee acted at that time and again following its December meeting.

In December, the accommodative moves were not confined to reserve pressures but were extended to other policy tools. On December 4, the Board of Governors announced that it would eliminate reserve requirements on nonpersonal time deposits and on Eurocurrency liabilities by cutting the reserve requirement ratios on these deposits in two steps beginning in mid-December.[19] The timing coincided with a normal seasonal rise in reserve needs and therefore limited the size of the open market operations called for to absorb the reserves released by the cuts. Lower requirements were expected to reduce costs for depository institutions holding more reserves to meet requirements than necessary for clearing purposes, because institutions do not earn interest on reserve balances. The Board anticipated that the action would provide an added incentive for these institutions to lend to creditworthy borrowers and thus would counter, to some extent, the observed tightening in credit terms.

Soon after, on December 18, the Board of Governors approved a cut in the discount rate to 6½ percent from the 7 percent rate that had prevailed since February 1989. It took the step in response to the weakness in the economy, constraints on credit, and anemic money growth.

Policy implementation

Behavior of discount window borrowing

Implementation of open market policy in 1990 was complicated by the continued deterioration of the relationship between discount window borrowing and the federal funds rate. The FOMC specifies its policy objectives in terms of desired degrees of reserve pressure, a concept associated with attaining a specified

[19]The Board reduced the reserve requirement ratio for nonpersonal time deposits with an original maturity of less than eighteen months to 1½ percent, from 3 percent, for the reserve maintenance period running from December 13 to December 26 and then eliminated the requirement in the following maintenance period. Time deposits maturing in eighteen months or more have been exempt from reserve requirements since 1983.

mix of nonborrowed and borrowed reserves.[20] By managing nonborrowed reserves, the Desk seeks to achieve a chosen level of borrowed reserves, which are supplied by the discount window under the adjustment and seasonal programs.[21] The portion of required reserves not provided as nonborrowed reserves must be borrowed from the discount window if reserve deficiencies are to be avoided. As long as there is a predictable degree of reluctance to borrow, a specified level of borrowing is expected to be consistent with a particular degree of money market pressure, as measured by the spread between the federal funds rate and the discount rate. In recent years, however, depository institutions have become less willing to borrow from the discount window; thus, a larger spread between the federal funds

[20]See Ann-Marie Meulendyke, *U S Monetary Policy and Financial Markets* (Federal Reserve Bank of New York, 1990), chap. 6, for a complete discussion of the borrowed reserve operating procedure

[21]Reserves can also be borrowed under the extended credit program. This facility is used by depository institutions in financial difficulty Institutions borrowing under this program are expected to concentrate on resolving their basic problems instead of seeking funds to repay the loan; thus, their borrowing is more likely to be for extended periods than for the short intervals of adjustment

Footnote 21 continued
borrowing Institutions borrowing under the extended credit program may be charged an above-market rate that exceeds the basic discount rate

Table 2

Specifications from Directives of the Federal Open Market Committee and Related Information

Date of Meeting	Specified Short-Term Growth Rates M2	Specified Short-Term Growth Rates M3	Borrowing Assumption for Deriving NBR Path	Associated Federal Funds Rate†	Committee Preference for Degree of Reserve Pressure	Prospective Reserve Restraint Modifications: Guidelines for Modifying Reserve Pressure	Factors to Consider for Modifications (In Order Listed): 1	2	3	4
	(Percent)		(Millions of Dollars)	(Percent)						
12/18 to 12/19/89	November to March 8½	5½	150 125 on 12/20‡	8.50 8.25 on 12/20	Decrease slightly	A slightly greater or slightly lesser degree *would* be acceptable	Progress toward price stability	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets
2/6 to 2/7/90	December to March 7	3½	125 150 on 2/8§	8.25	Maintain	A slightly greater or slightly lesser degree *would* be acceptable	Progress toward price stability	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets
3/27/90	March to June 6	4	150 200 on 4/26§ 300 on 5/3§	8.25	Maintain	A slightly greater or slightly lesser degree *would* be acceptable	Progress toward price stability	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets
5/15/90	March to June 4	3	300 350 on 5/17§ 400 on 6/14§ 450 on 6/28§	8.25	Maintain	A slightly greater or slightly lesser degree *would* be acceptable	Progress toward price stability	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets
7/2 to 7/3/90	June to September 3	1	450 400 on 7/13‡ 450 on 7/26§ 500 on 8/2§	8.25 8.00 on 7/13	Maintain	A slightly greater degree *might* be acceptable A slightly lesser degree *would* be acceptable	Progress toward price stability	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets

†The middle of the federal funds rate trading area that is expected to be consistent with the borrowing assumption. The discount rate remained at 7 percent from the beginning of the year until December 19, when it was reduced to 6.50 percent.
‡Change in borrowing assumption reflects change in reserve pressures
§Change in borrowing assumption reflects technical adjustment

rate and the discount rate has been needed to induce institutions (in the aggregate) to borrow the amount assumed by the Committee. (Notes on the FOMC directives, the expected degree of money market firmness, and the borrowing assumptions used to construct the reserve paths are in Table 2.)

During 1990, the reluctance to borrow from the discount window became even more pronounced. Against the backdrop of the savings and loan associations' ongoing difficulties, developments in leveraged buyout and real estate lending raised public concerns about the financial health of depository institutions. The Bank of New England was a focus of attention early in the year. Then, between September and year-end, concerns about a number of large banks intensified as a result of reports of large losses, dividend reductions, and mounting evidence of an economic downturn. Moreover, throughout this period there was heavy media coverage of those institutions considered to be under earnings stress.

This intense scrutiny by the press tended to reinforce the perception that depository institutions borrowing from the discount window were in financial straits [22]

[22] Attention has focused on adjustment borrowing. Seasonal borrowing, used primarily by small agricultural banks during the growing season when their loan demand is seasonally strong, has not been affected.

The Federal Reserve does not release data on individual bank

Table 2

Specifications from Directives of the Federal Open Market Committee and Related Information
(Continued)

Date of Meeting	Specified Short-Term Growth Rates M2	Specified Short-Term Growth Rates M3	Borrowing Assumption for Deriving NBR Path	Associated Federal Funds Rate†	Committee Preference for Degree of Reserve Pressure	Prospective Reserve Restraint Modifications: Guidelines for Modifying Reserve Pressure	Factors to Consider for Modifications (In Order Listed): 1	2	3	4
	(Percent)		(Millions of Dollars)	(Percent)						
8/21/90	June to September 4	2½	500	8 00	Maintain	A slightly greater degree *might* be acceptable A somewhat lesser degree *would* be acceptable	Progress toward price stability	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets
10/2/90	September to December 4	2	500 450 on 10/4‖ 400 on 10/18§ 350 on 10/29‖ 300 on 11/8§	8 00 7 75 on 10/29	Maintain	A slightly greater degree *might* be acceptable A somewhat lesser degree *would* be acceptable	Progress toward price stability	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets
11/13/90	September to December 1-2	1-2	300‡ 225 on 11/14‖ 200 on 11/23§ 150 on 12/6§ 125 on 12/7‡ 100 on 12/13§	7 75 7 50 on 11/14 7 25 on 12/7	Decrease slightly	A slightly greater degree *might* be acceptable A somewhat lesser degree *would* be acceptable	Progress toward price stability	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets
12/18/90	November to March 4	1	100 125 on 12/19††	7 25 7 00 on 12/19	Decrease slightly	A slightly greater degree *might* be acceptable A somewhat lesser degree *would* be acceptable	Progress toward price stability	Trends in economic activity	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets

†The middle of the federal funds rate trading area that is expected to be consistent with the borrowing assumption. The discount rate remained at 7 percent from the beginning of the year until December 19, when it was reduced to 6 50 percent.
‡Change in borrowing assumption reflects change in reserve pressures.
§Change in borrowing assumption reflects technical adjustment.
‖Change in borrowing assumption reflects technical adjustment and a change in reserve pressures.
††The borrowing assumption was increased so that only part of the accommodation from the cut in the discount rate would show through to the market.

This perception is, in fact, not consistent with long-standing practices or with the periodic needs of the banking system. From time to time, healthy institutions find themselves unexpectedly short of reserves late in the day, perhaps because reserve position managers were not informed of a large deposit outpayment or because an expected inflow of funds did not materialize. In such circumstances, the institutions generally turn first to the federal funds market and other money markets, but they may not be able to obtain enough funds at reasonable rates to meet their needs if reserves are scarce for the banking system as a whole. Previously, when such systemwide shortages prevailed, banks would bid for funds in the market until rates rose to a level sufficiently high above the discount rate to induce institutions short of reserves to come to the window for adjustment credit.[23] The additional reserves thus introduced would relieve the institutions' own reserve deficiencies and, with them, the systemwide shortage. Recently, with the heightened reluctance on the part of many institutions to borrow, banks have been bidding the funds rate to very high levels as they seek to avoid borrowing. Nonetheless, when the entire system is

Footnote 22 continued
borrowing However, it may occasionally be possible for other banks to infer the probable identity of a borrower from their observation of the institution's behavior in the funds market or from the district-by-district Federal Reserve data published for Wednesdays

[23]The Federal Reserve extends such credit for a limited time period, usually one day to two weeks, depending on the size and nature of the institution involved

Table 3

1990 Reserve Levels

(Millions of Dollars, Not Seasonally Adjusted)

Period Ended	Required Reserves (Current)	Required Reserves (First Published)	Excess Reserves (Current)	Excess Reserves (First Published)	Total Reserves	Adjustment and Seasonal Borrowed Reserves	Nonborrowed Reserves plus Extended Credit Borrowed Reserves (Current)	Nonborrowed Reserves plus Extended Credit Borrowed Reserves (First Published)	Nonborrowed Reserves Interim Objective†	Extended Credit Borrowed Reserves
Jan. 10	63,844	63,962	1,117	1,020	64,961	320	64,641	64,661	65,042	19
24	61,627	61,668	841	958	62,468	273‡	62,195	62,355	62,520	27
Feb. 7	59,735	59,774	1,220	1,217	60,955	832§	60,123	60,159	60,573	33
21	59,585	59,599	968	992	60,553	1,348‖	59,205	59,245	60,430	133
Mar. 7	59,633	59,643	797	816	60,430	126	60,304	60,333	60,443	1,841
21	59,997	60,020	737	832	60,734	184	60,551	60,669	60,820	1,995
Apr 4	59,633	59,640	1,078	1,120	60,711	192	60,519	60,568	60,440	1,965
18	62,675	62,600	665	782	63,341	206	63,135	63,176	63,448	1,676
May 2	61,040	61,081	1,105	1,138	62,145	257	61,889	61,963	61,844	899
16	59,657	59,865	927	862	60,584	303	60,281	60,423	60,514	673
30	58,526	58,603	1,011	1,014	59,537	625	58,912	58,992	59,220	1,098
June 13	60,709	60,801	479	348	61,188	732	60,456	60,417	61,432	559
27	60,046	60,042	1,020	1,072	61,066	383	60,683	60,731	60,574	183
July 11	60,944	60,957	898	841	61,842	399	61,443	61,399	61,522	182
25	59,609	59,611	875	837	60,484	534	59,950	59,914	60,172	298
Aug. 8	59,599	59,617	764	709	60,363	489	59,874	59,836	60,024	419
22	60,367	60,292	910	1,019	61,277	1,086	60,192	60,225	60,790	38
Sept. 5	59,304	59,365	893	848	60,197	631	59,566	59,582	59,688	8
19	61,546	61,577	746	733	62,292	701	61,591	61,610	62,027	5
Oct. 3	59,832	59,739	1,122	1,243	60,954	507	60,447	60,474	60,115	9
17	61,021	61,099	984	956	62,004	388	61,616	61,668	61,658	13
31	59,471	59,534	650	635	60,121	372	59,749	59,798	60,145	26
Nov. 14	61,132	61,249	982	915	62,114	257	61,857	61,907	61,947	25
28	61,006	61,034	966	1,055	61,972	169	61,804	61,921	61,785	25
Dec. 12	61,513	61,618	561	497	62,073	106	61,968	62,010	62,431	25
26	56,113	56,017	1,922	2,111	58,034	482	57,552	57,646	57,569	22

Note. The allowance for excess reserves generally was $950 million. In the period ended January 10, it was $1.2 billion. In the period ended December 26, it was set at $1.5 billion initially and then raised to $1.7 billion to reflect both year-end demands and increased demands during the phase-in of the reserve requirement cut.

†As of the final Wednesday of the reserve period.
‡Includes $111 million of special situation adjustment borrowing, which was treated as nonborrowed reserves.
§Includes $665 million of special situation adjustment borrowing.
‖Includes $1,096 million of special situation adjustment borrowing

short of reserves, the borrowing must occur because there is no other way for the banking system as a whole to obtain reserves late in the day

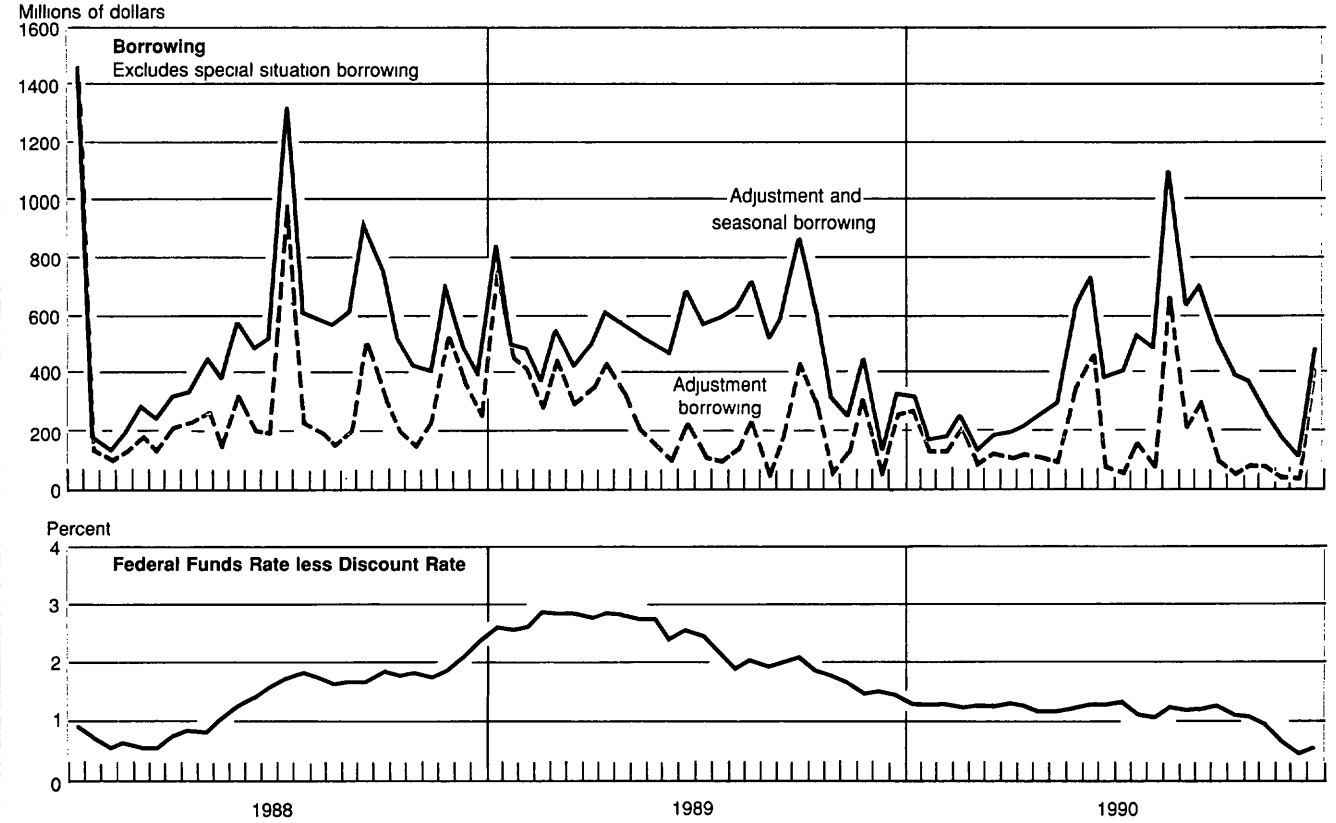
In part reflecting the reluctance to borrow, adjustment borrowing was typically very light in 1990, as it had been in the latter half of 1989. (Actual reserve levels appear in Table 3) Contributing to the light borrowing were the generally narrower spreads of the funds rate over the discount rate Narrower spreads emerged as policy became more accommodative and the discount rate was held at 7 percent for most of the year. During many maintenance periods, adjustment credit was very low until the final day, when borrowing sometimes rose in the face of settlement day pressures The low point for adjustment borrowing in 1990 occurred in the December 12 maintenance period, when borrowing averaged a minimal $19 million at a time when the average funds rate exceeded the discount rate by 43 basis points (Chart 7) This average for adjustment borrowing was the lowest since July 1980, a period when the funds rate was considerably lower than the discount rate.

For the year, adjustment credit averaged $231 million, while the spread between the funds rate and the discount rate averaged 112 basis points. Early in the year, however, the Bank of New England borrowed steadily for about a month under the adjustment credit program This special situation borrowing was treated as akin to extended credit borrowing, and the Desk disregarded it in assessing how adjustment borrowing was behaving. Later borrowing by the institution was formally classified as extended credit borrowing. Excluding the special situation borrowing, average adjustment credit was $159 million Comparable figures for 1989 and 1988 were $243 million and $293 million per day, while spreads averaged 228 basis points and 137 basis points, respectively.

Seasonal borrowing followed its typical pattern of

Chart 7

Borrowing and the Spread between the Federal Funds Rate and the Discount Rate



rising in the spring and declining in the fall (Chart 8) The rise in seasonal borrowing was accommodated through eight increases in the borrowing allowance from February through August, while its decline was reflected in six reductions in the allowance from October through the year-end. On two occasions, October 29 and November 14, reductions were made both to reflect routine decreases in seasonal borrowing and to reduce reserve pressures Seasonal borrowing peaked in the August 22 maintenance period at an average $432 million per day.[24] For the year as a whole, seasonal borrowing averaged $223 million, compared with $274 million in 1989 and $235 million in 1988.

Operating procedures

The Committee formally followed a borrowed reserve operating procedure in 1990, however, it took account of the uncertain relationship between borrowing and the federal funds rate, as it had in the previous two years. The Desk treated the intended levels of borrowing flexibly in order to achieve the desired policy stance, designed so that federal funds generally traded in a narrow range around the Committee's expected rate. The Desk continued to evaluate estimated needs to add or drain reserves when planning the nature and size of its daily operations, but it was also guided by the funds rate prevailing before its typical market entry time, around 11 30 a m. to 11:40 a m , when determining whether to perform an operation Market participants focused on the federal funds rate as an indicator of the Federal Reserve's policy stance, even though the Federal Reserve does not have complete control over this rate

One complication of paying greater heed to the funds rate was that federal funds at times traded at rates that were not consistent with reserve projections made by the staffs of the New York Reserve Bank and the Board of Governors Such inconsistencies often occurred when market participants expected an imminent shift in the Federal Reserve's policy setting At these times, the funds rate sometimes reflected the expected policy move instead of the current reserve picture. In these circumstances, the Desk usually deferred addressing the reserve situation rather than risk misleading market participants about the stance of policy Indeed, after the experience of late November 1989, the Trading Desk sought to signal policy moves more clearly in 1990 in an effort to minimize the possibility of misunderstanding.[25]

Open market operations and reserve management

In 1990, the System's portfolio of securities grew by $12 billion, somewhat below the average annual increase of $14.3 billion registered over the 1981-88 period In the first eleven months of the year, the portfolio showed an increase of $18.7 billion, the bulk of which was in Treasury bills In December, however, the Desk reduced the portfolio by $6.7 billion to absorb part of the reserves released by the cuts in reserve requirement ratios This contraction was accomplished through sales of Treasury securities to foreign accounts and redemptions of bills at auctions

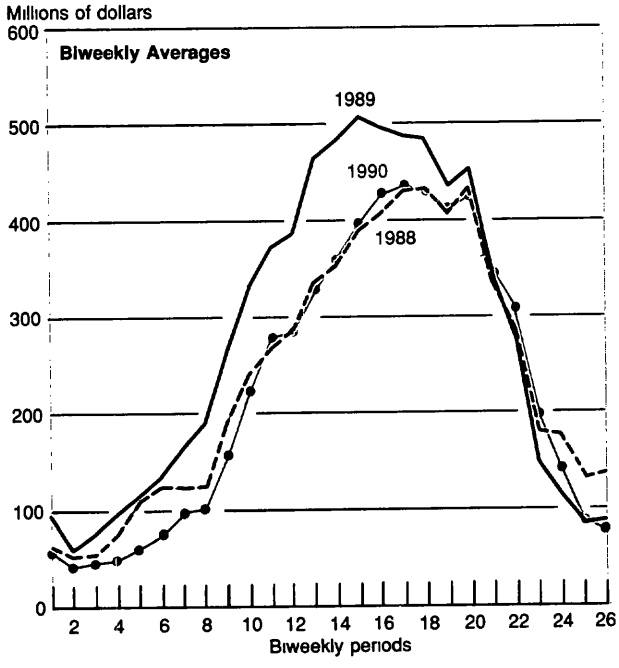
As usual, the primary motivation for growth in the portfolio during the year was to offset reserve drains from currency issuance Currency rose at an exceptionally rapid pace, primarily because of a dramatic surge in shipments to foreign countries. The $26.1 billion growth in currency was the largest ever and about twice that recorded in the previous year. Other factors that can affect the supply of reserves were mostly trendless in 1990, although holdings of foreign currency and special drawing rights increased reserve levels modestly over the year In contrast, foreign currency acquisitions added considerably to reserve levels in

[24]Peak period averages in 1989 and 1988, respectively, were $509 million (July 26 period) and $433 million (October 5 period)

[25]See "Monetary Policy and Open Market Operations during 1989," Federal Reserve Bank of New York *Quarterly Review*, vol 15, no 1 (Spring 1990), p 63

Chart 8

Seasonal Borrowing



1989 and led the Desk to reduce its portfolio of U.S. Treasury securities.

Weakness in total reserve demand restrained somewhat the need to expand the portfolio over the first eleven months of the year. Required reserves fell by $2.3 billion between the reserve maintenance period ended January 10 (which included year-end 1989) and that ended December 12 because reservable deposit growth was slow and deposits were at their seasonal peak at the start of the year. Required reserves then declined by $10 billion in the next two reserve maintenance periods—less than the $13½ billion released by the reserve ratio reduction because of the seasonal increase in transactions deposits. Meanwhile, the drop in reserve demand related to the cut in requirements was partially offset by elevated excess reserve demands (described below).

Desk operations: January through November

The Desk made outright purchases of Treasury bills in the market on five occasions when reserve projections suggested large, sustained needs to add reserves.[26] (The appendix gives details of portfolio changes.) The pattern of purchases in 1990, as in most years, generally reflected seasonal variation in currency growth and Treasury balances. A purchase on October 31 was in part necessitated by the reserve drain created from the unwinding of a warehousing transaction involving deutsche marks. Later, a transaction on November 28 was smaller than usual in anticipation of the cut in reserve requirements announced six days later.

In April, the Desk usually adds to the System portfolio because required reserves rise as taxpayers build transactions deposit balances to handle tax payments and because high tax receipts swell the Treasury's balance at the Federal Reserve. In April 1990, the Desk expanded the portfolio by nearly $6 billion, somewhat less than the average increase of recent years because the Treasury balance was far below its usual late April levels. In 1990, an unusually large $38 billion of cash management bills matured soon after the tax payment date. Paying off these bills depressed the Treasury's balance at the Federal Reserve relative to its typical late April levels. Furthermore, tax receipts were lower than normal.

Desk operations: December

The reserve requirement cut had a profound impact on the reserve management strategies of depository institutions and the Trading Desk. Total required reserves on nontransactions deposits had been met by about $11¾ billion of deposits at the Federal Reserve and about $1¾ billion of vault cash. The reduction in requirements enabled additional institutions to meet their reserve requirements entirely with vault cash, while others found that the level of balances that they were required to hold at the Federal Reserve fell sharply. At the same time, many depository institutions found that they needed to hold reserves for clearing purposes in excess of their new lower requirements. Depository institutions' reserve accounts are used to process hundreds, or perhaps even thousands, of transactions each day, and their reserve balances swing sharply during the course of the day. Institutions can project these swings to some extent but also face late day surprise inflows and outflows. As a result, they try to hold positive balances in their accounts to guard against being inadvertently overdrawn at the end of the day. In many cases, the balances needed to avoid such overdrafts are close to or exceed those needed to meet requirements.

The Trading Desk recognized that, following the cut in reserve requirements, demands for excess reserves would probably far exceed typical levels, but it could not quantify with any precision how much depository institutions would want to hold and for what length of time. The cut in requirements was expected to lift permanently the banking system's demand for excess reserves because many depository institutions would need to hold such reserves to help meet their clearing needs. Moreover, it was anticipated that excess reserve demand would temporarily run above this new, permanently higher range while institutions adjusted to their new levels of requirements. Past experience was not a good guide in helping to determine either the size or the persistence of the elevated demands because the magnitude of the reductions for Federal Reserve member banks was unprecedented and because neither nonmember nor foreign institutions had ever had their requirements reduced.

Gauging excess reserve demands in future maintenance periods was also complicated by uncertainty about the volume of required clearing balances. A depository institution can establish such a balance by specifying an average level of reserves that it will hold on deposit at the Federal Reserve for clearing purposes in addition to any balances that it must hold to meet reserve requirements. In exchange, it receives credits on its required clearing balance that it can use to pay for priced services from the Federal Reserve, such as check processing. Thus it earns implicit interest on its required clearing balances. These balances are an attractive way for institutions that use priced services to obtain some cushion against unexpected reserve outflows from their reserve accounts and consequently to reduce their excess reserves, which by law pay no

[26]The Desk sold bills in the market on one occasion early in the year when required reserves and currency were declining seasonally

interest. The Desk knows required clearing balances for a given maintenance period at the beginning of that period, but not those for future periods Thus, the Desk anticipated that future demands for excess reserves would be relieved to some extent by the opening of required clearing balances, but it could only make rough estimates about the extent to which depository institutions would choose such balances [27]

The reserve requirement reductions made it necessary to drain reserves to avoid leaving the banking system with excess reserve levels far more massive than it could want; however, the magnitudes of the reserve drains were highly tentative because the extent of the increase in excess reserve demand was uncertain. Consequently, the Desk drained reserves cautiously because it did not want to withdraw too many reserves and thus create undesired firmness in the money market, especially around the year-end when demands for liquidity were high. The Desk therefore eschewed an outright market transaction in December. Instead, it opted to reduce the portfolio gradually by running off $1 billion of maturing bills at the Treasury bill auctions each week for four weeks and by selling about $2.7 billion of securities to foreign accounts

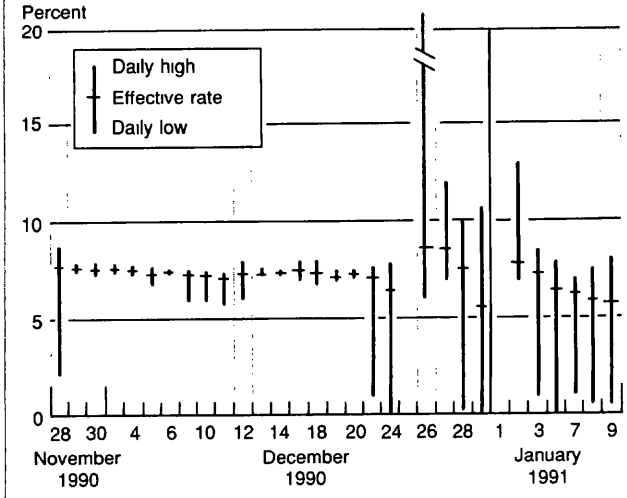
Unusually high demands for year-end funding complicated the Desk's ability to drain reserves in late 1990. Year-end funding demands were greatest in late November and again in mid-to-late December. Japanese banks, in particular, were early aggressive borrowers of both term monies and forward two-day funding for December 31 and January 1.

Depository institutions managed their reserve positions cautiously during the December 26 maintenance period, which contained the first phasedown of requirements The funds rate was often firm in the morning, especially in the second week The Desk responded with what it estimated were generous reserve provisions, so that a sizable cushion of excess reserves had been built up by the settlement day Indeed, funds trading touched a low of 1/16 of 1 percent late on December 24. On the December 26 settlement day, the Desk refrained from market action to affect reserves because federal funds were trading on the soft side, projections suggested that reserve supplies were ample, and the cushion of excess reserves was sizable But an unexpected shortfall in reserve supplies, a maldistribution of reserves, and sharply higher than anticipated demands for excess reserves all contributed to a late day spike in the federal funds rate, which reached a record high of 100 percent before closing at a lofty 80 percent. Reserve market pressures were aggravated that day by demands from foreign and regional banks, some of which apparently had little or no collateral on deposit with the Federal Reserve to pledge against a loan from the discount window. In the end, a number of institutions borrowed; adjustment and seasonal borrowing soared to nearly $5 billion, while excess reserves, which had averaged about $900 million in the first twenty-five maintenance periods of the year, rose to $1.9 billion.

The true extent of the demand for excess reserves was especially difficult to measure during the following maintenance period, which ended January 9, 1991 The demand for excess reserves is generally high around the year-end because depository institutions face uncertain reserve flows in view of the massive shifting of funds that occurs as entities dress up their balance sheets In 1990, excess reserve demand was expected to be sharply above even this elevated level because of the cut in requirements. On December 27, the first day of the period, a firm funds rate reflected nervousness about funding over the year-end, in part because of the tight market at the close on the previous day. The Desk sought to assure market participants that it was prepared to provide ample liquidity, it entered the market early to arrange a sizable round of overnight System repurchase agreements (RPs) for that day ($6 billion), and it took the unprecedented step of making commitments for a two-day System RP on Monday, December

Chart 9

Daily Trading Ranges for Federal Funds



Notes Shaded areas represent settlement days Federal funds rate reached a high of 100 percent on December 26

[27]Required clearing balances rose from $1 8 billion in the maintenance period ended December 12 to nearly $2 billion in the period ended January 9, 1991 They continued to rise in early 1991

31, that would span the New Year's Day holiday. It arranged $15.7 billion of System RPs on this basis—one of the largest volumes ever arranged—out of requests for nearly $34 billion. Nonetheless, depository institutions bid up the funds rate in early trading on Friday and Monday, December 28 and 31, despite large cushions of accumulated excess. The Desk again entered the market early on Friday and arranged $11 billion of over-the-weekend System RPs. On Monday, it added another $2.7 billion of reserves with a two-day operation, supplementing the substantial volume of prearranged transactions. The reserve additions wound up exceeding demand; funds closed at zero at one broker on that day.

The Desk's generous reserve provision in the face of large demands from the banking system created roughly $10 billion of excess reserves during the first week of the period. Once the year-end passed, depository institutions sought to pare their excess reserve holdings. In order to do so, they had to hold reserve balances that were likely to be insufficient for clearing purposes. Since their reserve needs for clearing purposes were uncertain until late on most days, they held onto their reserves for much of the day, thus keeping the funds rate on the firm side. Then, late in the day, they released the reserves into the federal funds market, and the funds rate plunged. Consequently, the funds rate showed unusually large intraday swings (Chart 9).

Forecasting reserves and operating factors

As the Desk formulated a strategy for meeting reserve needs, it took account of potential revisions to the estimated demand for and supply of reserves. On the demand side, these revisions could take the form of changes in estimated required reserve levels or in the banking system's desired excess reserve balances. On the supply side, revisions to operating factors could change the reserve outlook. In both cases, revisions late in the maintenance period were especially difficult to deal with since they could necessitate very large reserve operations.

Staff forecasts of reserve levels in 1990 were about as accurate as those in 1989. Forecasts of required reserves and excess reserves improved modestly, on average, while forecasts of operating factors were comparable in accuracy to those made in the previous year. As usual, forecasts of both the demand for and the supply of reserves improved as the maintenance period progressed because additional information became available. Mean absolute forecast errors were cut roughly in half by midperiod and reduced substantially by the final day of the period. (See appendix for details.)

The two operating factors that proved hardest to forecast in 1990 were the Treasury's balance at the Federal Reserve and currency growth. Large forecast errors for the Treasury balance were made in April and September, two months with major tax dates. In April, tax flows fell below expectations and differed substantially from typical historical patterns. In late September, tax receipts exceeded initial forecast levels, while expenditures were lower than expected. Meantime, forecasts of currency generally fell short of actual levels over the first three quarters of the year. The underpredictions were especially large following the Iraqi invasion of Kuwait, when shipments of U.S. currency abroad surged. In the fourth quarter, when the strong growth of currency abated somewhat, forecasts generally overestimated currency growth.

Appendix: Reserve Management and the System Open Market Account

This appendix summarizes outright and temporary transactions conducted by the Trading Desk in 1990 and the factors that prompted them. A final section reviews the accuracy of staff estimates of the supply of and demand for reserves, estimates that help to determine the Desk's reserve management strategy.

Outright changes in the System portfolio

Total System holdings of U.S. government securities rose $12.0 billion in 1990 to end the year at $247.6 billion (Table A1).[†] This rise contrasted sharply with the record $10.2 billion decline in 1989, but it was somewhat below the average increase recorded over the 1985-88 period. In the first eleven months of 1990, when the full increase for the year occurred, the $18.7 billion net expansion exceeded the pace set over the corresponding period in 1988, when the portfolio expanded by $13.1 billion. The pre-December expansion in 1990 offset reserve drains from operating factors.[‡] In December, however, the portfolio was reduced by $6.7 billion in response to the cuts in reserve requirement ratios. For the entire year, the System portfolio grew at less than half the pace of total marketable Treasury debt, and the System's share of such debt fell nearly 1 percentage point to 11.1 percent.

[†]This level is reported on a so-called commitment basis. It reflects the commitment made on December 28 to sell $20 million of Treasury bills to foreign accounts for delivery on January 2, 1991, and the commitment, made on the final business day of 1990, to redeem $1 billion of Treasury bills on January 3, 1991. It excludes the temporary changes in the portfolio from the execution and repayment of MSP transactions with foreign accounts because the sales include commitments to repurchase the securities. It also excludes RP operations because they are temporary in nature and are arranged for the Federal Reserve Bank of New York account rather than the System account.

[‡]Operating factors are sources and uses of nonborrowed reserves other than Desk-initiated open market operations in government securities. Operating factors include the Treasury's Federal Reserve balance and the System's foreign currency assets.

Table A1

System Portfolio: Summary of Holdings
(Billions of Dollars)

		Change from:		
	Year-End 1990 Holdings	Year-End 1989 to Year-End 1990	Year-End 1988 to Year-End 1989	Year-End 1987 to Year-End 1988
Total holdings	247.6	12.0	−10.2	14.5
Bills	118.7	11.8	−11 1	5.4
Coupons	122 6	0.4	1.3	9.7
Agency issues	6.3	−0 2	−0.4	−0.6

Notes: Holdings are reported on a commitment basis. Totals may not add because of rounding.

Composition of the System portfolio

The increase in the System portfolio was almost all in Treasury bills. The System's bill holdings expanded slightly more than they had shrunk in 1989. Coupon holdings rose modestly in 1990. Meanwhile, Federal agency holdings edged down about $200 million because all but a small part of such holdings were rolled over at maturity. With the preference for bills, the weighted average maturity of the portfolio fell by 2.2 months, to 40.5 months.

Bank reserve behavior

The expansion of the System portfolio over the year was prompted by the reserve drains from currency issuance. Currency issuance drained over $26 billion of reserves between the reserve maintenance period ended January 10, 1990, and that ended January 9, 1991 (Table A2). Currency growth in 1990 was boosted by a dramatic surge in currency shipments to foreign countries.

Operating factors other than domestic currency, on net, added about $2½ billion to reserve levels over the year, compared with the substantial $26 billion injected in 1989. The difference is largely explained by the behavior of foreign currency holdings. In 1989, foreign currency accounted for a $22 billion increase in reserve levels, primarily reflecting dollar sales in foreign exchange markets and the Treasury's warehousing of foreign currency with the Federal Reserve System. This substantial volume of reserves more than covered the reserve drain from domestic currency growth and prompted the Desk to reduce the System's portfolio of U.S. government securities. In contrast, foreign currency added only about $1¾ billion to reserve levels over 1990, in part because net warehousing activity reduced foreign currency holdings and intervention was only modest.[§] Meanwhile, interest earnings lifted foreign currency holdings by over $2½ billion. The net depreciation of the dollar provided reserves because it raised the dollar value of the System's foreign currency portfolio.

Total reserve demand contracted in 1990, reflecting a drop in required reserves. Required reserves fell $2.3 billion between the maintenance period ended January 10 and that ended December 12, largely because of weak

[§]In order to complete one "de-warehousing" transaction, the Federal Reserve monetized $1½ billion of special drawing rights for the Exchange Stabilization Fund, a move that added to reserves The Exchange Stabilization Fund used the proceeds to repurchase a portion of its warehoused foreign currency.

Appendix: Reserve Management and the System Open Market Account *(Continued)*

growth in reservable deposits. In the next two maintenance periods, required reserves fell about $10 billion. This drop was less than the $13½ billion released by the reserve requirement cut because transactions deposits rose to their seasonal highs. Excess reserves were sharply higher in these two maintenance periods, reflecting adjustments by depository institutions to the new requirements and year-end funding pressures

The supply of total reserves fell markedly during the year When required reserves fell, nonborrowed reserves also declined, although to a lesser extent, while borrowing fell modestly and excess reserves rose. The decline in borrowing was concentrated in the adjustment credit component. Borrowings under both the seasonal and the extended credit programs were roughly unchanged, on balance, over the year

Table A2

Bank Reserves
(Millions of Dollars)

	Maintenance Period Ended 1/9/91	Change from Period Ended 1/10/90 to Period Ended 1/9/91	Change from Period Ended 1/11/89 to Period Ended 1/10/90
Nonborrowed reserves			
Excluding extended credit	54779	−9844	1245
Including extended credit	54800	−9841	57
Extended credit borrowing	22	3	−1189
Borrowed reserves			
Including extended credit	295	−44	−1709
Adjustment plus seasonal†	274	−47	−521
Adjustment†	233	−30	−485
Seasonal	41	−17	−36
Required reserves‡	51481	−12363	−412
Excess reserves	3592	2475	−52
System portfolio and operating factors (Billions of dollars)			
System portfolio	247 6	12 0	−10 2
Operating factors			
Foreign currency§	33 0	1 7	22 1
U S currency	286 5	−26 7	−13 0
Treasury balance	7 4	−1 6	1 5
Float	2 7	1 5	−0 3
SDRs	10 0	1 5	3 5
Gold deposits	11 1	—	—
Foreign deposits	0 3	0 1	−0 1
Applied vault cash	28 9	0 6	1 7
Other items	15 7	0 3	−2 4
Foreign RP pool‖	6 7	−1 2	−0 2

Notes. Figures may not add because of rounding Signs on changes in System portfolio and operating factors indicate impact on bank reserves
†Adjustment borrowing includes $85 million of special situation borrowing in the period ended January 9, 1991
‡Not adjusted for changes in required reserve ratios
§Market value
‖Includes customer-related repurchase agreements

Outright transactions

The Desk conducted outright operations when reserve projections suggested large, sustained needs to add or drain reserves The total volume of outright activity was $38 4 billion, somewhat smaller than in 1989, although much larger than in 1988 Virtually all of the Desk's outright activity took place in Treasury bills Purchases totaled $25 2 billion. Sales and redemptions, which made up the balance of outright activity, were larger than those in most other reserve-adding years, mainly because of the need to drain reserves in December.

Roughly half of the Desk's outright activity was conducted in the market and about one-third was carried out with foreign accounts Redemptions of maturing securities, which totaled $5 6 billion, accounted for the remainder The Desk entered the market on six occasions to conduct outright transactions, all of which were in Treasury bills. It sold $3 billion on January 31 It then bought $4.4 billion on April 4, $3.2 billion on May 30, $2.8 billion on August 29, $3.3 billion on October 31, and $2 9 billion on November 28. Net purchases from foreign accounts were $3.9 billion.

Temporary transactions

The Desk also met reserve needs through self-reversing transactions—RPs to add reserves and MSP transactions in the market to drain reserves Such transactions help to smooth the uneven pattern of reserve availability that arises from the daily movements in operating factors MSP transactions are also arranged each day with foreign official accounts to meet their demand for an overnight investment facility‖ On occasions when the Desk desires to make a reserve injection, some of these orders can be arranged in the market, as customer-related RPs These RPs routinely mature on the next business day because participation in the foreign investment pool varies daily

System RPs accounted for about two-thirds of the total volume of temporary reserve additions, with the remainder provided by customer-related RPs The Desk arranged sixty-three System RP operations for a total of

‖See Meulendyke, *U S Monetary Policy and Financial Markets*, p 146, for a complete discussion of the reserve impact of the overnight investment facility

Appendix: Reserve Management and the System Open Market Account *(Continued)*

$262 billion, and sixty-seven customer RP operations for $128 billion The Desk entered the market before its normal intervention time on two occasions in 1990 to combat unusually strong year-end funding pressures. It also conducted its first forward RP, as described in the text. The highest balance of outstanding RPs was $18 3 billion on December 31.

Thirty-four of the System RP operations had terms exceeding one business day Most of these operations allowed early withdrawals, an option that appeals to dealers but can complicate the Desk's planning by leaving the amount of added reserves uncertain. To facilitate the planning of open market operations when multiday System RPs are outstanding, the Desk on June 14 changed the deadline for withdrawing collateral for such RPs from 1:00 p.m. to 11:00 a.m. The earlier deadline ensured that the Desk knew the magnitude of withdrawals before conducting its operations

Roughly 10 percent of the temporary transactions arranged in the market drained reserves Most of these MSP transactions were executed early in the year, when currency and required reserves fell seasonally. The Desk also drained reserves temporarily in December and early January 1991 following the cut in reserve requirements, but it was predominantly adding reserves on a temporary basis at this time to counter year-end funding demands. Over the year, the Desk arranged twenty-one rounds of MSP transactions in the market for a total of $48 billion Ten of these rounds spanned more than one business day

Forecasting reserves and operating factors

When the Desk formulated a strategy for meeting reserve needs, it took account of potential revisions to the estimated demand for and supply of reserves. Large revisions late in the maintenance period were especially troublesome because they could necessitate very large reserve operations In 1990, staff forecasts of reserve demand improved modestly, while the accuracy of forecasts of operating factors was similar to that of the preceding year's forecasts (Table A3) ††

The accuracy of required reserve forecasts at the beginning of reserve periods was slightly better in 1990 than in 1989, while the mid- and late period estimates were of similar accuracy in the two years. The improvement in beginning-of-period forecasts was accomplished despite a $150 million increase in the mean absolute period-to-period change in required reserves. When preparing these forecasts, the staff faced some challenges, including dealing with uncertainty about deposit levels following large tax payment dates and deciphering distor-

††The Trading Desk uses forecasts of required reserves, excess reserves, and operating factors made by staffs at the Federal Reserve Bank of New York and the Board of Governors The Desk also considers a forecast of the Treasury's Federal Reserve balance, an operating factor, made by Treasury staff

Table A3

Approximate Mean Absolute Forecast Errors for Various Reserves and Operating Factors
(Millions of Dollars)

	1990			1989		
	First Day	Midperiod	Final Day	First Day	Midperiod	Final Day
Reserves						
Required	300-320	195	70	330	195-215	70-90
Excess†	125-150	115-135	—	135-150	130	—
Factors	1010-1030	530-570	70-95	890-1080	440-460	70-90
Treasury	630-670	380-430	45	730-810	390-420	40
Currency	500	210-280	30	350-390	160-200	25
Float	190-225	140-170	35-40	200-230	130-175	30-40
Pool	260	120	10	275	110	10

Note Forecast errors are expressed as a range to indicate the varying degrees of success achieved by the staffs of the Federal Reserve Bank of New York and the Board of Governors

†The reported forecast errors overstate the degree of uncertainty about excess reserves The Desk supplements beginning-of-period and midperiod forecasts with informal adjustments that are based on the observed pattern of estimated excess reserve holdings as each maintenance period unfolds Federal Reserve staffs make no formal model forecasts of excess reserves on the final day of the maintenance period

Appendix: Reserve Management and the System Open Market Account *(Continued)*

tions in deposit flows during the power failure in New York in mid-August As maintenance periods progressed, forecasts became more accurate as additional deposit information became available. The mean absolute prediction error was over one-third smaller at midperiod and was sharply lower on the final day

The excess reserve forecasting performance also improved slightly in 1990, despite the uncertainties about excess reserve demand in the December 26 maintenance period The mean absolute period-to-period change in excess reserves was about the same as in 1989. Until the December 26 period, the largest prediction errors occurred at times when large banks ran sizable deficiencies in order to make use of their large carryovers Actual excess reserves, which were relatively low during these periods, were at first substantially overpredicted [‡‡]

The accuracy of the forecasts of operating factors in 1990 was roughly in line with that in 1989 As usual, the forecast errors shrank as the maintenance period progressed Overall, there was a tendency to overestimate the supply of reserves from operating factors This tendency was especially apparent over the last six periods of the year, when forecasts made on the final day of the period overpredicted the supply of reserves by an average $100 million to $135 million (on a period-average basis), errors equivalent to final day misses of about $1 4 billion to $1 9 billion These misses at times aggravated settlement day pressures in the funds market

The forecast errors for the Treasury's balance at the Federal Reserve were slightly smaller than in 1989 The largest error occurred in the period ended May 2 Individual income tax receipts, which were forecast to be quite large, were expected to fill the Treasury's accounts in the banking system to capacity, thus causing large remittances that would swell the Fed balance.[§§] However, tax receipts fell short of projections. Sizable errors began to appear in mid-April, but they were first attributed to timing problems Later in the year, large forecast errors in the October 3 period drained reserves when taxes came in higher, and spending came in lower, than expected For the year as a whole, the Treasury's Fed balance was less volatile than in previous years Capacity limitations drove the balance above the $5 billion target level on only about fifteen business days, compared with about fifty-five business days in 1989.

An additional feature that contributed to forecast errors in 1990 was a change in tax remittance regulations Previously, employers remitted all withheld taxes to the Treasury according to fixed schedules. Beginning in August, employers were required to remit these taxes as soon as withholdings reached $100,000. For large firms, this change resulted in a considerable speedup in tax remittances For a time, it became more difficult to predict daily flows to the Treasury because the historical patterns used by the forecast staffs were based on the earlier withholding schedules After several months of observing the data flows, the staffs discerned a new tax remittance pattern; by year-end, major forecast misses due to the change were largely eliminated

Forecasting U.S. currency in circulation proved to be more demanding than usual in 1990, while the forecasting performance for other reserve factors was similar to that in previous years. Growth in currency was unusually strong throughout the first three quarters of 1990, and initial estimates fairly consistently underpredicted this strength In the fourth quarter, after the volume of currency shipped abroad subsided somewhat, initial forecasts of currency in circulation tended to overpredict currency growth

[‡‡]The carryover privilege permits depository institutions to apply a limited amount of their excess or deficient reserve position in one period to their requirements in the following period Large banks monitor their reserve balances closely Before the cut in reserve requirements in December, they were reasonably successful in keeping non-interest-bearing excess reserves within the carryover allowances, so that their average holdings of excess reserves over a year typically were close to zero Carryovers therefore tended to produce a sawtooth pattern of excess reserve holdings at large banks This pattern at times showed through to aggregate excess reserve holdings The Desk does not receive much information about "carry ins" until midperiod

[§§]Depository institutions must fully collateralize and pay interest on funds held with them in so-called Treasury tax and loan (TT&L) accounts The amount of funds that the institutions will accept depends on their ability to use the funds profitably and on the availability of collateral An institution that receives funds in excess of its collateral limit remits the excess to the Treasury's Federal Reserve balance (The excess funds come either from the taxes collected by the institution on behalf of the Treasury or from investments made directly by the Treasury) Large remittances typically occur around major tax dates, when the volume of funds flowing into TT&L accounts substantially exceeds capacity