Monetary Policy and Open Market Operations during 1988

Overview

Monetary policy in 1988 sought to contain inflationary pressures while sustaining the longest recorded economic expansion in U.S. peacetime history. Initial concerns about the fragility of the economy and financial markets in the aftermath of the October 1987 stock market crash gave way to a realization that economic activity was still strong and potential price pressures were building. As the balance of perceptions shifted, the Federal Open Market Committee (FOMC) began in March to increase the degree of reserve pressure from the minimal levels that had prevailed after the stock market break. Concerns about inflation intensified during the year as various sectors of the economy appeared to approach constraints on physical capacity and as declining rates of unemployment suggested increasing wage pressures. These concerns were confirmed by the release of price and compensation data that showed a significant pickup in inflation and labor costs, although the increases were not as large as some observers had feared. The incremental firming of reserve pressures, which was augmented by the August 9 increase in the discount rate to 6½ percent, continued through the year's end.

Over the early months of 1988, the FOMC directed the Trading Desk to return gradually to the pursuit of reserve objectives characterized by specified levels of discount window borrowing, after a period of heightened sensitivity to money market conditions that followed the stock market break. At various times during the year, however, depository institutions appeared unusually reluctant to borrow, even when spreads of the federal funds rate over the discount rate were relatively large. The continued reluctance to use the discount window complicated the reserve management procedures that depended on a reasonably predictable relationship between borrowing and the spread between the federal funds rate and the discount rate. The Trading Desk dealt with this complication by pursuing the borrowing objective with added flexibility in order to avoid appreciably firmer money market conditions than the FOMC desired.

The economy proved surprisingly resilient as real GNP advanced at a 2.8 percent rate in 1988 (fourth quarter over fourth quarter), despite the potentially destabilizing effect of the stock market crash and a severe drought in the spring and summer. Growth was fueled by consumer spending, business fixed investment, and a pickup in net exports that was encouraged by the sharp decline in the foreign exchange value of the dollar in previous years. As the economy expanded, employment rose rapidly and the unemployment rate fell to 5.3 percent in December 1988. While the labor market tightened and labor costs accelerated, signs of physical capacity constraints also emerged as the capacity utilization rate rose to its highest level since

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1979. Most price measures reflected these pressures, especially the Producer Price Index, which showed its sharpest increase since 1981.

The yield curve flattened, particularly in the latter part of 1988, as short-term interest rates rose in response to the growth of economic activity and prices, and to the actual and expected firming of policy. Market participants focused closely on incoming economic data, especially the monthly payroll employment survey, for signs of continuing growth that could bolster inflation and induce further policy moves. Long-term yields finished the year little changed, partly for technical reasons, but also because of the expectation that the gradual firming of policy would ultimately contain inflation. The steadiness of the dollar in the foreign exchange markets through much of the year lent support to fixed-income security prices.

Following sluggish growth in 1987, expansion of the broader monetary aggregates accelerated modestly in 1988 as M2 advanced 5.4 percent and M3 rose 6.4 percent (fourth quarter over fourth quarter), leaving M2 somewhat below and M3 slightly above the midpoints of their respective growth ranges.[1] Total debt expanded 8.7 percent, close to the middle of its monitoring range, and M1 grew 4.2 percent. Monetary growth was moderate over the first half of the year, then decelerated over the second half as rising market interest rates lifted the opportunity costs of holding money.[2]

Policy implementation was made more difficult in 1988 by the apparent shifts in the demand for borrowed reserves. Over much of the year, various levels of discount window borrowing tended to be associated with firmer-than-expected money market rates. During the months that followed the stock market break, when concerns about financial market stability lingered, the preference of depository institutions to conserve their borrowing privileges was not surprising. However, even after it became clear that economic activity was expanding and that a serious banking and financial crisis was unlikely, the reluctance to borrow persisted. Part of the tendency for borrowing to run below anticipated levels, given market interest rates, appeared to be the product of market expectations of firmer policy over the spring and summer. The August discount rate hike and subsequent economic reports that suggested a moderation of growth seemed to restore a more customary relationship between borrowed reserves and federal funds rates. Nevertheless, a greater discrepancy in the relationship between rate spreads and borrowing resurfaced in the fall after seasonal borrowing fell off sharply from unusually high levels. The Desk again responded by interpreting the allowance for discount window borrowing flexibly. Finally, in November, a downward adjustment to the borrowing allowance was made to reflect the apparent downward shifts in the willingness to borrow. At the same time, policy was tightened further in response to strength in economic activity.

The economy and domestic financial markets

The economy

The longest U.S. peacetime expansion since at least the middle of the nineteenth century continued in 1988 as real economic activity grew at a moderate rate, despite the stock market crash in October 1987 and a severe drought in many areas of the country. Real GNP increased 2.8 percent in 1988 after its inventory-fueled rise of 5.0 percent in 1987.[3] The U.S. Department of Commerce estimated that in the absence of the drought, real GNP would have grown 3.5 percent. Consumer spending accounted for much of the advance in real growth, with business fixed investment and net exports providing the rest. Real final sales grew 3.9 percent, compared with 3.0 percent in 1987. Meanwhile, labor markets tightened as the total unemployment rate fell to a 14-year low of 5.3 percent in the fourth quarter of 1988, a one-half percentage point decline from the fourth quarter of 1987. Total employment rose by 1.9 percent, somewhat below its 1987 pace; nonfarm payroll growth in export-related industries was strong. Physical capacity also constrained growth in some sectors of the economy, as the capacity utilization rate climbed to 84.5 percent in December, compared with 82.6 percent one year earlier.

The declining unemployment rate and growing relevance of capacity constraints led to a significant pickup of inflation in 1988, with the price acceleration more evident at the early stages of production than at the consumer level. For example, the employment cost index for private industry rose 4.9 percent for the year

[1] All money growth rates cited in this report are based on the data available before the benchmark and seasonal revisions in February 1989. The debt figures reflect revisions through February 16. The earlier data are used because they represent the information available to the FOMC members at the time that they made their decisions. The revisions were minor overall. Over the four quarters of 1988, the revisions lowered the growth rates of M2 and M3 by one-tenth percentage point and two-tenths percentage point, respectively, and raised the growth rate of M1 by one-tenth percentage point.

[2] The February 1989 revisions did produce some leveling of the pattern of growth over the year. The growth of M2 was revised downward in the first half of the year and raised in the second, while the growth of M3 was revised downward over the first three quarters and raised in the fourth.

[3] All growth rates in this section are expressed on a fourth quarter over fourth quarter basis unless otherwise specified.

ending December 1988, exceeding its 3.3 percent increase in 1987. The Producer Price Index rose 4.0 percent from December of 1987 to December of 1988, an increase markedly higher than the 2.2 percent rise in 1987. More broadly, the rate of inflation as measured by the GNP implicit price deflator accelerated one and two-tenths percentage points to 4.3 percent. Meanwhile, the growth rate of the Consumer Price Index remained unchanged at 4.4 percent (December to December). Energy costs were basically unchanged, while food prices increased two and a half times faster over the last nine months of the year than they had over the first three months, reflecting the impact of the drought. Excluding these often volatile components, consumer prices rose 4.7 percent, up from 4.2 percent in 1987.

Real personal consumption expenditures grew at about twice their 1987 rate, while real disposable personal income rose modestly faster than in 1987.[4] Consumption, especially its durable goods component, revived in the first quarter of 1988 as consumer confidence appeared to overcome the stock market break. Consumption expanded steadily over the remainder of the year.

Real private domestic investment fell 1.0 percent in 1988, after a sizable 17.5 percent advance in 1987. Most of the 1987 rise in investment, however, had come from a bulge in inventories in the fourth quarter, a result of the drop in consumption after the stock market break. In 1988, in contrast, expansion of real nonresidential fixed investment, especially producers' durable equipment, played a large role in investment expansion as companies invested heavily in office and computer equipment. Inventory accumulation was high in the first quarter of 1988 but slowed over the final three quarters in lagged response to the rebound in consumption and continued strength in exports. Meanwhile, spending on nonresidential structures fell in response to high vacancy rates in many locales and perhaps to rising interest rates.

The merchandise trade deficit, measured in current dollars, narrowed by about $30 billion to $128 billion in 1988, while the real merchandise trade deficit shrank by about the same amount. These declines largely reflected the lagged effect of the 1985-87 dollar depreciation and productivity gains in manufacturing, both of which enhanced the competitiveness of U.S. products. Exports grew robustly again in 1988, led by exports of capital goods. Import growth decelerated slightly from its 1987 pace because of slower growth in capital goods imports. Nevertheless, as the value of the dollar stabilized in 1988, the rate of reduction of the trade deficit slowed in the latter part of the year. Overall, the trade-weighted value of the dollar appreciated 3.6 percent from December 1987 to December 1988.

The remaining component of GNP, real government purchases of goods and services, was about unchanged in 1988 because fiscal restraint at the federal level was offset by increased purchases at the state and local levels. Real nondefense purchases by the federal government declined as a result of a drought-induced decline in the purchases of crops by the Commodity Credit Corporation. Real defense spending fell for the first time since 1978. For fiscal year 1988, the federal budget deficit increased to $155.1 billion from $144.7 billion in 1987, mainly reflecting higher interest payments on public debt and significantly larger outlays by the Federal Savings and Loan Insurance Corporation (FSLIC) to close insolvent thrift institutions. Receipts grew at about half of their 1987 pace, which had been buoyed by special one-time factors related to the Tax Reform Act of 1986.

The severe drought had a significant impact on real economic growth. Total losses of crops and livestock reduced real agricultural output by an estimated $12.1 billion over the year and trimmed about seven-tenths percentage point from real GNP growth. The drought also distorted the growth pattern of real GNP. The unadjusted numbers suggest a weakening between the first and second halves of the year. When real growth is adjusted for the drought, however, the slowdown between the two halves of the year is less pronounced.[5]

The pace of economic expansion in 1988 surprised many observers who had anticipated that the collapse of stock market prices in October 1987 would lead to a significant slowdown. Real consumption was expected to be damped because the crash wiped out an estimated $800 billion of household wealth held in corporate equities, both directly and indirectly through pension funds. Real investment was also expected to slow because the crash raised the cost of equity capital for firms.

A number of factors appear to have accounted for the muted impact of the crash on the real economy. First, the crash only erased the capital gains that had accumulated since the beginning of 1987. The erasure of the rapidly accumulated capital gains earned in the

[4]Consumer spending fell in the fourth quarter of 1987 in response to the expiration of automobile sales incentives and the stock market break. Recovery from this decline tended to boost growth over the four quarters of 1988.

[5]The drought is estimated to have reduced real GNP growth by nine-tenths percentage point, one-half percentage point, and one and one-tenth percentage points in the second, third, and fourth quarters, respectively. The "drought-adjusted" growth rates are 3.4, 3.9, 3.0, and 3.5 percent for the four quarters of 1988.

stock market would have affected consumption only to the extent that these gains had been incorporated into consumer spending behavior. Since temporary increases in wealth are typically not immediately translated into consumption, and since stock holdings are concentrated in the hands of wealthy individuals who are less likely to tap capital gains for consumption purposes, the impact on consumption was mitigated. Furthermore, bond market capital gains earned in the days following the stock crash offset some of the losses in the equity market.

In addition, the dramatic decline in interest rates that followed the stock market break, a product of the Federal Reserve's sizable provision of liquidity to financial institutions and revised expectations of future inflation, had important effects on the real economy. The Federal Reserve's prompt provision of liquidity and its assurances that it stood ready to manage future strains on the financial system to limit systemic risk helped to preserve essentially normal banking and financial market operations. Lower interest rates in late 1987 likely contributed to further declines in the foreign exchange value of the dollar and also offset the rise in firms' cost of equity capital. Exports rose because U.S. goods became more competitive in world markets; in turn, the increase in exports promoted investment and raised consumer incomes. Although noninventory investment may not have immediately responded to lower interest rates in the uncertain postcrash environment, the drop in rates probably contributed to the growth of fixed investment in 1988.

Domestic financial markets

The yield curve flattened considerably in 1988 as short-term interest rates rose sharply, while long-term rates finished the year about unchanged (Chart 1). Both short- and long-term rates declined over the first two months of the year (Chart 2). Short-term rates climbed steadily from March through the end of the year. Long-term rates also began to climb in early March, but the rate increases abated in June; long-term rates then fluctuated in a narrow range for the rest of the year, with a brief spike in August. Over the year as a whole, yield increases on Treasury coupon securities, as measured by the constant maturity series, ranged from about 190 basis points for securities with one year to maturity to only 5 basis points for those with 30 years to maturity. Treasury bill rates increased 170 to 220 basis points. Meanwhile, yields on highly rated corporate and municipal bonds actually fell around 40 and 10 basis points, respectively, as measured by Moody's Aaa bond indexes, which have average maturities of 20 years.

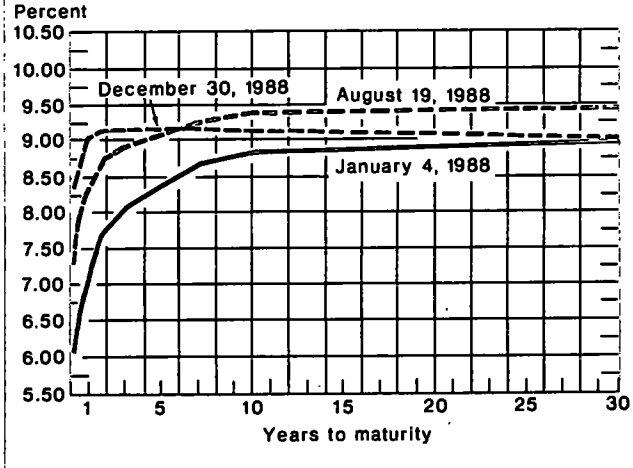
The major influences on financial markets in 1988 were the outlook for economic activity and inflation, and the expected and actual policy responses to economic and price developments. Market participants watched the regular releases of economic data with extreme care, especially the monthly report on payroll employment. Yields would rise in anticipation of strong gains and in response to job gains that exceeded expectations, as strong gains touched off fears of higher inflation and possible Federal Reserve tightening. Other economic reports were scrutinized for evidence that supported these views. The monthly release of the merchandise trade deficit was watched closely, in part because it affected the value of the dollar on foreign exchange markets, and also because strong export growth might intensify inflationary pressures. A falling dollar would raise yields because of concerns about inflation through rising import prices and the potential reluctance of foreign investors to participate in the U.S. bond market. On a day-to-day basis, market participants also followed the behavior of oil prices, various commodity price indexes, and the federal funds rate.

Treasury securities

Yields on all maturities of Treasury securities fell over the first two months of the year in response to the System's slight easing of monetary policy, which was confirmed in late February by Chairman Greenspan in his Humphrey-Hawkins testimony. Yields also fell because

Chart 1

Yield Curves for Selected U.S. Treasury Securities

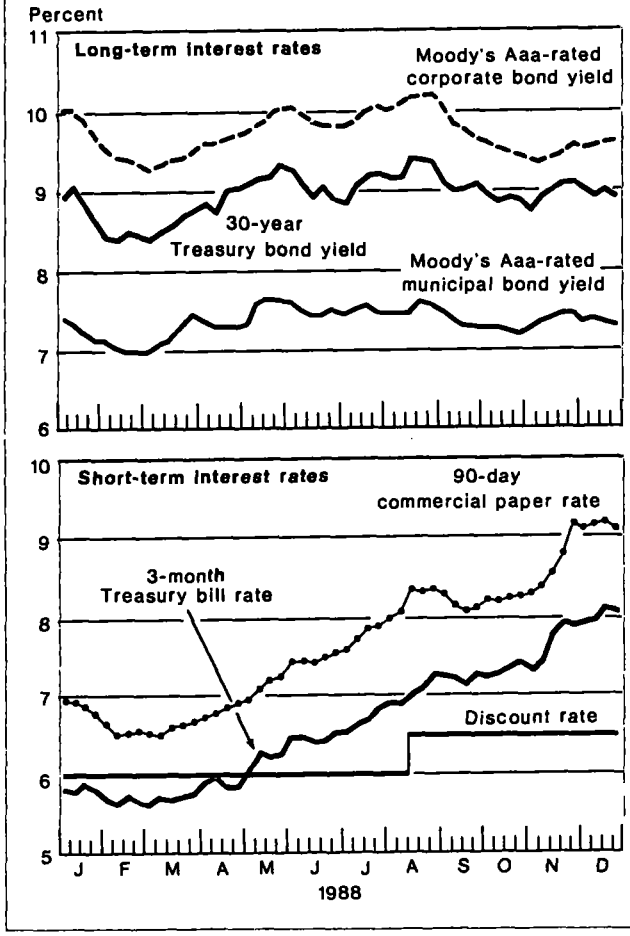


Note: Treasury bill yields are on a bond-equivalent basis, while coupon yields are constant maturity values.

economic releases suggested that the economy might be slowing and that inflationary pressures were low. In mid-January, the November trade deficit was reported to have narrowed as exports increased and imports decreased. Later, reports of an inventory-led rise in GNP in the fourth quarter of 1987 and the third consecutive monthly decline in the Index of Leading Indicators reinforced views that the economy had slowed after the stock market break. In addition, monthly price data showed only small increases. A stable dollar and a quarter-point cut in the prime rate to 8.5 percent in early February also added to the market's favorable tone. In mid-February, the narrowing of the December merchandise trade deficit initially supported expectations of lower interest rates, although many observers noted that the modest decline in imports (later revised to an increase) suggested that consumption might not be slowing much after all.

Chart 2

Long-Term and Short-Term Interest Rates



Yields firmed in early March and rose through late May, with long-term yields moving first. A surge in February nonfarm payrolls, reported in early March, jolted the market and cast doubt on the view that the economy was weak. Expectations of solid growth were later reinforced by substantial advances in personal consumption and income. Two more strong employment reports helped to fuel upward pressure on yields. Robust advances in inflation indicators and rising commodity prices, especially the price of oil, contributed to fears about higher future inflation. Yields were also pressured higher by the mid-April release of a wider February trade deficit and later by the March deficit, which was narrower but showed strong export and import gains. Treasury bill rates were driven higher by expectations that the System would tighten policy in response to the perceived strength of economic activity and the worsening outlook for inflation. Rates moved higher in May after a System move to increase pressures on reserves and a half-point increase in the prime rate to 9 percent. The upward pressure on bill rates persisted because speculation continued about further policy moves and the possibility of a hike in the discount rate.

Over the remainder of the year, yields on Treasury coupon securities, especially longer maturity issues, moved within a fairly narrow range. Generally, yields rose on stronger-than-expected employment reports, such as those released in July, August, November, and December, and fell on weaker-than-expected reports, such as those released in June, September, and October. With the exception of the June trade deficit, which was released in mid-August, the trade reports released over the remainder of the year were in line with expectations and had little impact on yields. Yields jumped after the Federal Reserve Board approved an increase in the discount rate on August 9 and remained firm for the rest of the month until signs of a moderation of economic activity emerged in September.

Meanwhile, after the May refunding, the Treasury had about exhausted its authority to issue bonds with coupon rates above 4.25 percent. Market participants anticipated that a 30-year bond might not be feasible in the August refunding auctions; indeed, none was offered. The limited supply kept yields on the 30-year bond under downward pressure throughout the summer and most of the fall. Congress finally removed interest rate restrictions on Treasury bonds in November, but the action was too late for the regular refunding to include a bond; the Treasury did sell a 30-year bond in late November. Demand for outstanding 30-year bonds

for STRIPS,[6] especially late in the year, also limited yield increases because it reduced the floating supplies of whole bonds. Nonetheless, longer term yields moved higher during November and December on signs of renewed economic growth and finished the year around 9 percent, little changed from the start of the year.

Unlike Treasury bonds, rates on Treasury bills and shorter term notes generally climbed from late May through the end of the year, with a sharp runup over the final two months. This progression caused the Treasury yield curve to flatten appreciably in the latter part of the year. At times, sections of the yield curve were inverted, particularly in December. Short-term rates were quite sensitive to market participants' expectations about tighter monetary policy and to manifestations of firmer policy. These expectations were heightened over the summer months by reports of strong employment growth and by expectations of the discount rate hike that was announced in August. Bill rates also were pressured higher in August (and again in November) by large increases in the supply of bills, as a result of the Treasury's issuance of cash management bills, rather than 30-year bonds, in the midquarter refunding auctions. Rates leveled off in September and October on signs of moderate economic growth and subdued inflation, and then rose sharply in early November in response to a much higher-than-expected payroll employment report. Rates climbed throughout November and December, buoyed by persistently firm federal funds rates and rumors of a possible discount rate hike.

U.S. government-sponsored agency securities

The focus of the agency market in 1988 was the insolvency of many thrift institutions. The Federal Home Loan Bank Board liquidated, took over, or merged 222 thrift institutions during the year at an estimated cost of $38.6 billion. The cost of closing the remaining 400 or so insolvent institutions is believed to be considerably more. Despite the continued difficulties of the thrift industry, spreads between yields on Treasury securities and those on the debt of the Federal Home Loan banks (FHLB) narrowed slightly from their levels at the end of 1987; investors apparently had confidence in FHLB securities, even though such securities do not have a formal government guarantee.

The Financing Corporation (FICO), the entity formed to help recapitalize FSLIC, offered $4.4 billion of 30-year bonds during 1988. Nonetheless, FSLIC remained technically insolvent. The spread of FICO over Treasury yields widened from about 90 basis points at the end of 1987 to around 115 basis points by the end of July because investors were concerned that FICO's $10.8 billion authorization would have to be expanded. The spread subsequently narrowed to roughly 70 basis points by the end of 1988. This narrowing reflected the widespread belief that the government would bail out the thrift industry and would ensure that FICO debt obligations would be met. (Currently, principal payments on FICO debt are backed by zero-coupon Treasury bonds, while the interest payments are secured by a first lien on insurance premia paid to FSLIC.) The extension of the congressional ban on thrift departures from FSLIC until August 1989, which ensured continued inflows of insurance premia to the insurance fund, also contributed to the narrowing of the spread. Moreover, the near equivalence of FICO principal payments to the principal portion of 30-year Treasury bonds encouraged market participants to create FICO strips amid a scarcity of strippable Treasury issues. In December, the spread between yields on FICO principal strips and yields on comparable Treasury STRIPS was about 30 basis points, while the spread between the yields on FICO interest strips and comparable Treasury STRIPS ranged from 40 basis points for maturities within one year to 80 basis points for maturities of seven or more years.

The financial health of the Farm Credit System (FCS) improved somewhat during 1988, even though one of its member banks was placed in receivership in May. Legislation to assist the FCS authorized the creation of the FCS Funding Assistance Corporation (FCSFAC) at the start of the year. The FCSFAC issues U.S. government-guaranteed 15-year bonds, up to an authorized limit of $4 billion; in 1988, it issued $690 million in bonds at an average spread of about 40 basis points over the yield on 10-year Treasury notes. The System also continued to issue debt that was not government-guaranteed. The spreads over comparable Treasury securities for these issues narrowed during 1988 but remained above the levels that prevailed before the System's troubles began. This narrowing was attributed in part to the improved financial condition of the FCS — the drought pushed agricultural commodity prices higher, enabling some farmers to resume loan payments to the FCS.

Corporate bonds

Public debt offered by U.S. corporations in the domestic bond market fell to $199 billion in 1988 from $209 billion in 1987, though issuance by foreign corporations rose somewhat.[7] Offerings of collateralized

[6]STRIPS refers to Separate Trading of Registered Interest and Principal of Securities. This program permits separation of the interest payments of a Treasury security from the principal payment for issues held in book-entry form.

[7]The data on corporate debt issuance come from IDD Information Services and the Federal Reserve Board.

securities, such as those backed by mortgages or other assets, jumped by 23 percent and accounted for almost half of the new-issue volume. The spread between yields on Aaa-rated corporate securities and 10-year Treasury notes narrowed during the March through May period as corporate yields lagged rising Treasury yields. The spread widened briefly in June, when new corporate issuance bulged, before narrowing steadily over the rest of the year.

The corporate bond market was rattled in late October when a fight for control of RJR Nabisco broke out after management announced an offer to take the company private through a leveraged buyout (LBO). RJR Nabisco had been considered too large to be taken private or taken over. By the time Kohlberg Kravis Roberts & Co. won the bidding at a price of $25 billion, prices of outstanding RJR Nabisco bonds had fallen considerably and yield spreads over Treasury issues had widened by 200 to 245 basis points because the LBO would be financed by issuing a substantial amount of additional debt. The spreads between yields on financial and utility bonds over industrial corporate bonds narrowed briefly (Chart 3) and activity in the industrial sector came to a standstill because investors were concerned that other firms previously believed to be immune to takeover attempts were now subject to such "event risk." Moreover, new issuance in this sector was virtually halted until late in the year when two issues came to market that contained "poison-put" provisions. Purchasers of these bonds can put, or resell, their bonds to the issuer at a specified price in the event of a corporate takeover, merger, or restructuring that results in the bonds losing their investment-grade status.

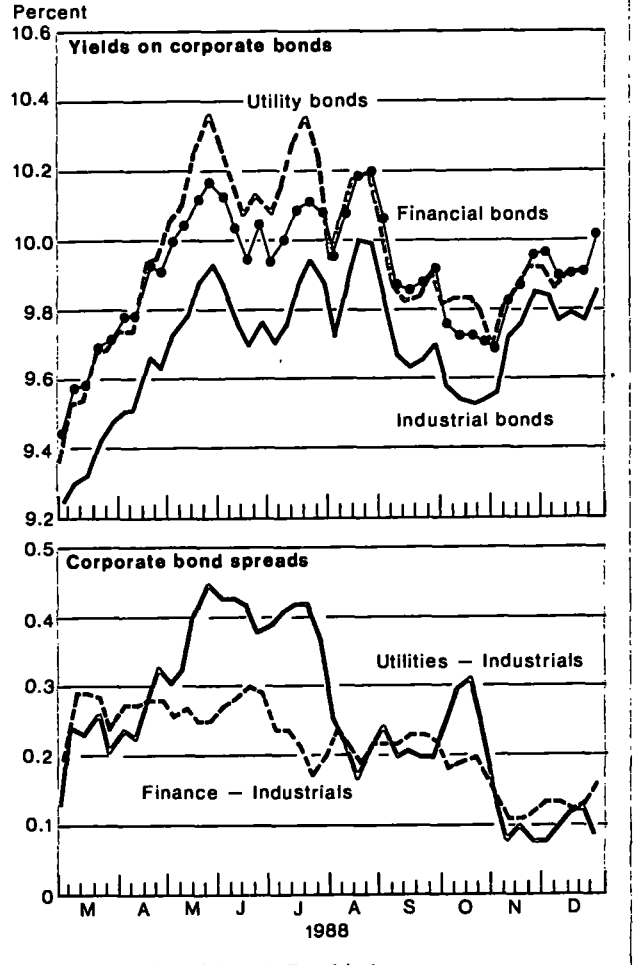
Issuance of below-investment-grade bonds, also known as "high-yield" or "junk" bonds, reached about $28 billion, slightly below its 1987 level. On balance, yields on these bonds relative to those on Treasuries narrowed by about 50 basis points. The market seemed to shrug off the Chapter 11 bankruptcy filing by Revco DS, Inc. on July 28 and the formal charges brought against Drexel Burnham Lambert, Inc., the largest underwriter of high-yield securities, in September. Revco, which had gone private in 1986 in a $1.25 billion LBO, defaulted on $700 million of interest payments to become the largest LBO failure to date. Drexel was charged by the Securities and Exchange Commission (SEC) with insider trading and other violations of securities laws. Just before the year's end, Drexel agreed with the Justice Department to plead guilty to criminal charges of securities fraud and other violations and to pay $650 million in fines and restitution. The agreement was contingent upon Drexel's settlement of the SEC charges.

In developments affecting major bank holding company (BHC) debt, the Supreme Court ruled in June that the Federal Reserve Board had correctly interpreted the Glass-Steagall Act in granting its limited approval for BHCs to underwrite and deal in securities backed by consumer receivables, municipal revenue bonds, private mortgage-related securities, and commercial paper. A district court judge, however, overturned the Comptroller of Currency's decision that national banks may issue securities backed by their own loans. Finally, 1988 saw the first hostile takeover of a BHC when the Bank of New York Company acquired Irving Bank Cor-

Chart 3

Corporate Bond Yields and Spreads

(Weekly Averages)



Source: Merrill Lynch Bond Indexes.

Note: Data not available before March 1988.

poration to form the twelfth largest BHC.

Municipal bonds

The municipal bond market was relatively quiet in 1988 after two years of turbulence caused, in part, by the Tax Reform Act of 1986. Investor demand for municipal bonds was generally strong during 1988 because municipal bonds were among the few remaining tax-sheltered investments available. According to the *Bond Buyer,* new issuance rose 4 percent to around $106 billion. With the increase in supply modest, most municipal bond yields declined, causing spreads below Treasuries to widen. The decline was not sufficient to encourage a large volume of refundings; refunding issues fell to about $29 billion, from $39 billion in the previous year.

Some new rules had an impact on the municipal bond market in 1988. In April, the Supreme Court ruled that Congress has the power to tax interest earned on municipal securities. Prices were sent sharply lower on fears that municipal bonds would lose their tax-advantaged status. Nevertheless, such fears were soon allayed because existing statutes were not altered by the decision and participants anticipated that outstanding issues would be "grandfathered" if new legislation were enacted. In late September, the SEC issued an interpretive release stating that underwriters must have a "reasonable basis for believing in the accuracy of key representations" made in issuers' bond documents before they bid on or sign deals.

The monetary aggregates

Growth of the broader monetary aggregates, M2 and M3, accelerated slightly in 1988, while growth of M1 and the debt aggregate slowed from their 1987 paces (Chart 4). The patterns of growth for M1, M2, and M3 show a sharp acceleration over the first half of the year relative to the sluggish rates of late 1987, and then a marked deceleration over the final half. Overall, M2 and M3 grew 5.4 and 6.4 percent, respectively, from the fourth quarter of 1987 to the fourth quarter of 1988. M1 advanced 4.2 percent, while debt expanded 8.7 percent, well within its monitoring range. The rates of monetary expansion over the year were within the Committee's growth cones.

In February, the FOMC reviewed the target ranges for the growth of M2 and M3 that it had tentatively set the preceding July. To focus attention on the need to restrain the expansion of domestic demand and to underscore its commitment to price stability over time, the Committee reduced the lower bound of the growth ranges for M2 and M3 to 4 percent, compared with the tentative lower bound of 5 percent for 1988 and the actual lower bound of 5.5 percent for 1987. The FOMC also voted to retain the upper bound of 8 percent growth for M2 and M3 tentatively set in July 1987. This upper bound was one-half percentage point below that used for 1987. The Committee widened the growth ranges in light of the increased volatility of the relationship between money growth and ultimate policy objectives, such as prices and output. It expected growth of the broader aggregates to accelerate to rates around the midpoints of the target ranges after the slow growth in 1987.

The FOMC also reviewed the tentative monitoring range for total domestic nonfinancial debt and its 1987 decision not to establish a numerical range for M1 growth. The Committee anticipated that the growth of nonfinancial debt would slow in 1988 because government borrowing was expected to decline. The Committee also widened the monitoring range for debt growth by one percentage point to a range of 7 to 11 percent, compared with a range of 8 to 11 percent in 1987. No growth range was specified for M1 because the relationship between M1 growth and the performance of the economy remained difficult to predict and interpret; M1 demand continued to be very sensitive to changes in interest rates. The Committee agreed to evaluate the growth of M1 in light of developments in the economy and financial markets, and the nature of emerging price pressures.

The aggregates grew briskly over the first half of the year in response to relatively narrow spreads between the rates on market instruments, such as Treasury securities, and those on monetary assets; such spreads can be interpreted as the opportunity costs of holding monetary assets. Through March, rates on Treasury securities continued around the reduced levels reached after the October 1987 stock market crash when investors sought the safe haven of Treasury securities. Since the rates on M2 deposits did not fall as quickly as market rates, the opportunity costs of holding monetary assets declined, thereby spurring the demand for these assets. In particular, the attractive rate spreads for consumer certificates of deposit (CDs) and money market mutual funds bolstered these categories of M2 through April. M2 growth may also have been helped by investor uncertainties about the outlook for the equity and bond markets. M1 growth, which stemmed from the expansion of other checkable deposits and currency, also contributed to the strength in M2. The vigorous expansion of M2 buoyed the growth of M3, while the non-M2 component of M3 grew modestly. Funds from M2 deposits were sufficient to finance most of the expansion of bank credit, allowing banks to rely less heavily on the managed liabilities in M3 and outside of the aggregates.

The growth of the aggregates, especially M2, mod-

Chart 4A

M2: Levels and Target Ranges

Cones and Tunnels

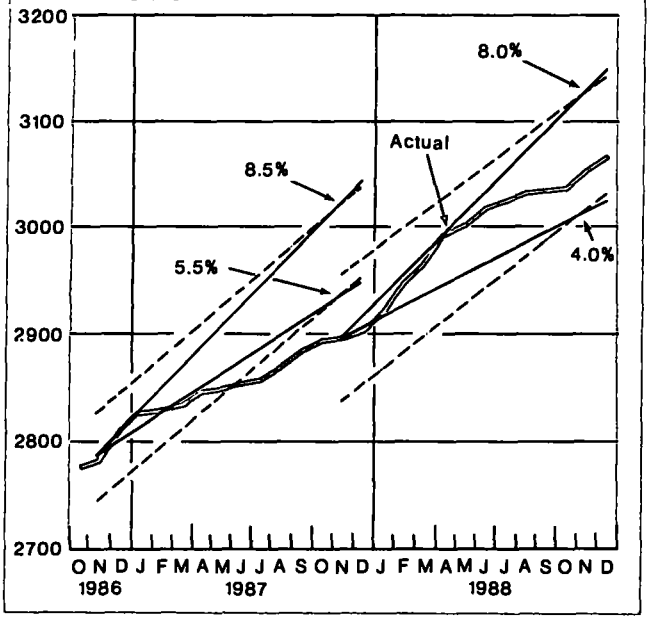


Chart 4B

M3: Levels and Target Ranges

Cones and Tunnels

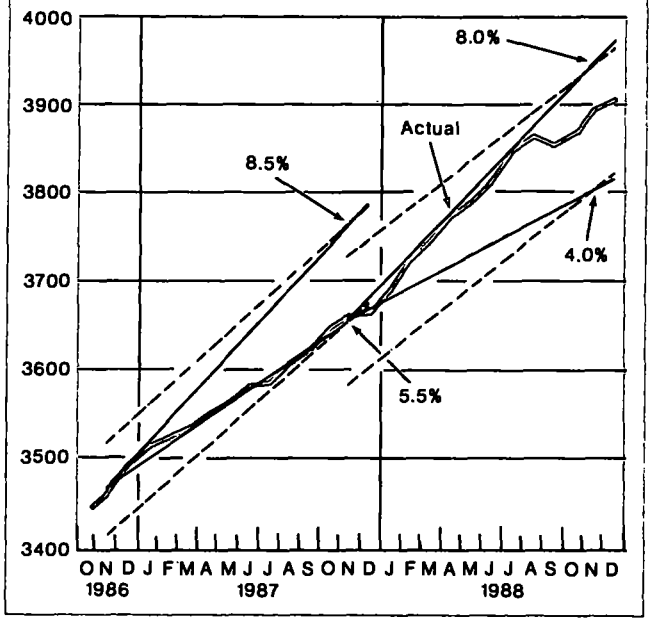


Chart 4C

Total Domestic Nonfinancial Debt Levels and Monitoring Ranges

Cones and Tunnels

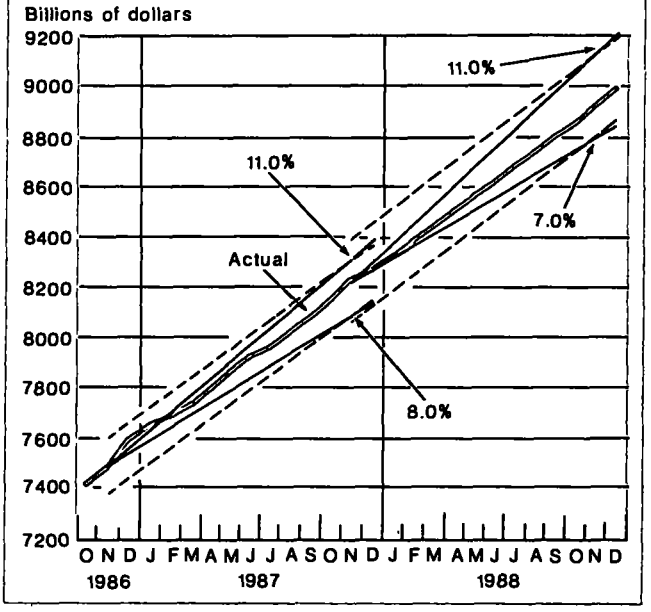
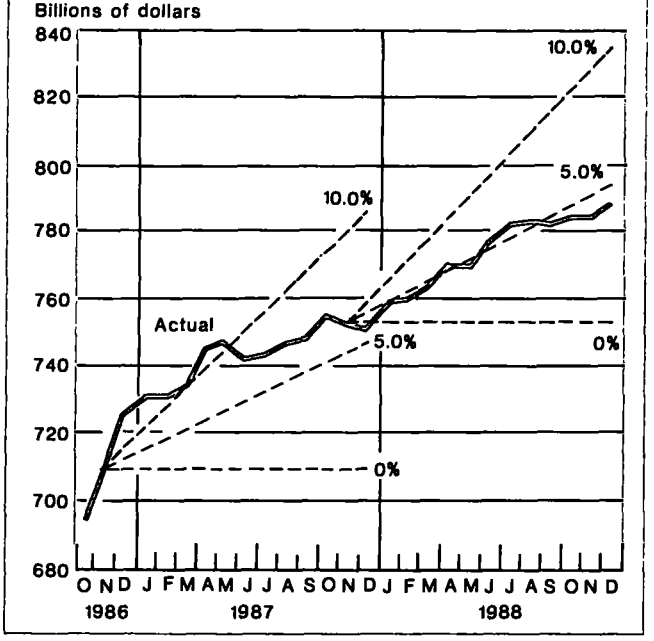


Chart 4D

M1 Levels and Growth Rates



erated in May and June. The moderation in May stemmed in part from an unwinding of the April buildup in transactions balances that accompanied the payment of taxes. Seasonal adjustment factors typically take account of such behavior; however, both the buildup and the runoff were larger than allowed for by these factors, thereby boosting the growth of these deposits in April and depressing their growth in May. In addition, growth in M2 was depressed by rising opportunity costs, which were precipitated by faster increases in market rates than in rates on M2 deposits. Meanwhile, bank credit expansion remained brisk. The expansion was financed by a modest rise in the issuance of the managed liabilities in M3 and by nondeposit sources of funds. However, M3 growth was slightly depressed by continued declines in institution-only money market funds. This component of M3 typically falls quickly when institutional investors observe a general rise in rates since yields on these funds tend to lag those on market instruments.

Even with this moderation, both M2 and M3 were still above the midpoints of their target ranges in June. M1 had expanded at a 5.1 percent rate over the first two quarters while total nonfinancial debt had increased at a rate of 8.5 percent, well within its monitoring range. In its midyear review, the Committee took account of a staff analysis that pointed to a slowing of M2 growth to around the middle of the target range as a result of slower income growth and in lagged response to increases in the opportunity costs of holding deposits. Furthermore, credit demands were projected to grow at a robust rate so that M3 would grow at a faster rate than M2 but would remain within its target range. Debt was projected to remain near the midpoint of its monitoring range. Accordingly, the Committee affirmed the 1988 ranges for growth in the monetary and debt aggregates.

Over the second half of the year, the growth of the aggregates decelerated especially sharply in response to the continued rise in market interest rates and in the opportunity costs of holding monetary assets. These increases had their most pronounced effect on the demand for liquid deposits (those that can be withdrawn on short notice without penalty but whose offering rates change relatively slowly). M1 growth slowed to a 2.7 percent rate over the June-to-October period. M2 growth was also dragged down by the weak expansion of savings deposits and money market mutual funds and by declines in money market deposit accounts, although small time deposits advanced as their rates were relatively more attractive. The pace of bank credit expansion from June to October was about half the rate experienced over the first half of the year. This slowdown, in conjunction with the weakness in M2, depressed M3 growth.

M2 and M3 growth picked up over the last two months of the year despite further increases in the opportunity costs of holding liquid deposits. The strengthening of M2 growth stemmed from steady increases in small time deposits and from strong inflows into money market mutual funds. Rates on these funds followed market rates more closely than the deposit rates on other liquid components of M2. Since the modest expansion of bank credit over these months was funded primarily with M2 deposits, the growth of the managed liabilities in M3 was very weak. At the end of 1988, M2 was slightly below and M3 was modestly above the midpoints of their respective target ranges.

In 1988, the growth of the income velocities[8] of M2 and M3 slowed to 1.7 and 0.8 percent, respectively, after having jumped to 4.1 and 2.7 percent in 1987 (Chart 5). M1 velocity growth increased modestly to 2.9 percent, while the income velocity of nonfinancial debt fell 1.4 percent, a bit more than its 1987 decline.

Over extended periods, most of the variation in the velocity of M2 can be explained by movements in the opportunity cost of holding M2 (Chart 6).[9] Such movements are also important for explaining the short-run behavior of M2 demand. According to a simple model, the rise in the opportunity cost of holding M2 deposits played a major role in the slowdown in M2 growth in the latter half of 1988. Nearly 85 percent of the variation in the velocity of M2 is explained by movements in its opportunity cost (and a dummy variable for the introduction of money market deposit accounts in December 1982). In 1988, the nearly one percentage point increase in the two-quarter moving average of the opportunity cost largely accounted for the four percentage point slowdown in M2 growth between the first and second halves of the year.

Policy implementation

Policy developments over the year

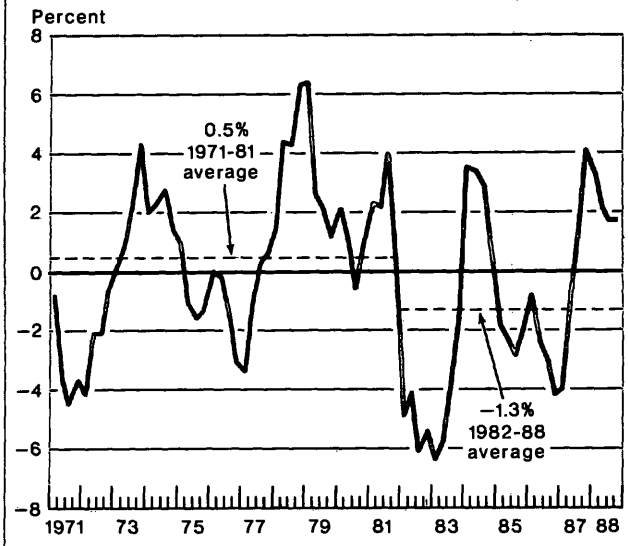
During the early months of 1988, discount window borrowing gradually resumed its role as the primary short-term policy guide. In order to calm market anxieties immediately after the October 1987 stock market crash, the FOMC—and the Desk—had relied heavily

[8]The income velocity of an aggregate is the ratio of nominal GNP to the level of the aggregate.

[9]The opportunity cost in the chart is the two-quarter moving average of a money market rate (defined here as the average of the bond-equivalent yield of the three-month Treasury bill, the 90-day commercial paper rate, and the large denomination CD rate in the secondary market) less the rate paid on M2 deposits. The rate paid on M2 is defined as a weighted average of the rates paid on each component of M2, where the weight is that component's share of M2 in the previous quarter.

Chart 5A

M2 Velocity Growth*

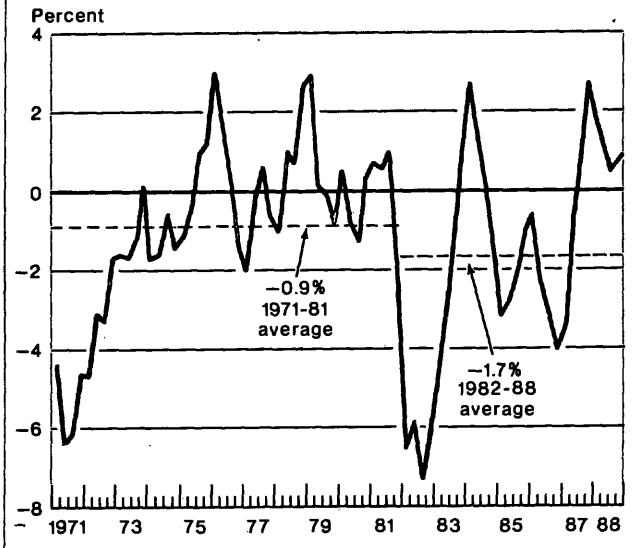


*Growth from four quarters earlier.

Shaded areas represent periods of recession as defined by the National Bureau of Economic Research.

Chart 5B

M3 Velocity Growth*

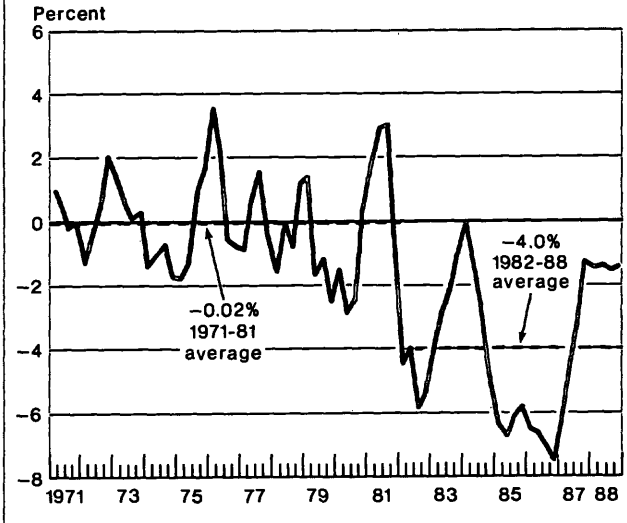


*Growth from four quarters earlier.

Shaded areas represent periods of recession as defined by the National Bureau of Economic Research.

Chart 5C

Total Domestic Nonfinancial Debt Velocity Growth*

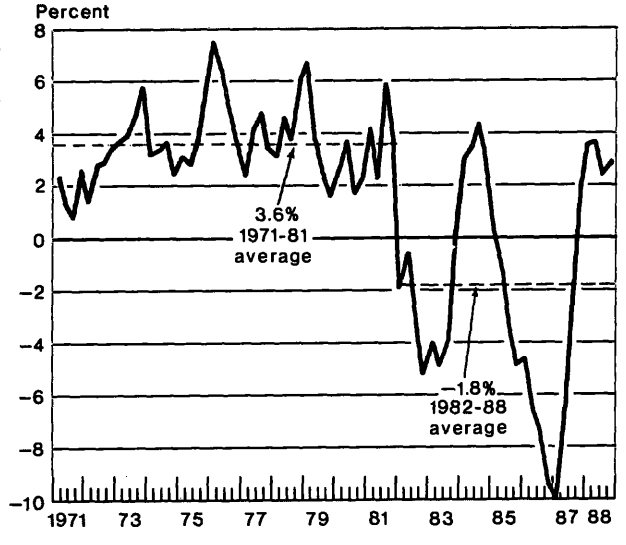


*Growth from four quarters earlier.

Shaded areas represent periods of recession as defined by the National Bureau of Economic Research.

Chart 5D

M1 Velocity Growth*



*Growth from four quarters earlier.

Shaded areas represent periods of recession as defined by the National Bureau of Economic Research.

on the federal funds rate for guidance. The transition back to a borrowed reserve approach began in December 1987, as the sense of fragility in the financial markets diminished. Then, in the spring of 1988, data began to suggest that economic activity was more robust than it had appeared in preceding months. For a while, policy implementation retained some increased sensitivity to the potential for adverse market reactions to financial developments, but borrowed reserves regained much of their earlier weight. The FOMC formally completed its return to the precrash borrowed reserve operating procedure at its mid-May meeting, when it eliminated the sentence in the policy directive that called for special flexibility in view of the fragile state of the financial markets. Later in the year, the Desk was again particularly alert to the behavior of the funds rate when the demand for borrowed reserves appeared to shift. (Notes on the FOMC directives and the assumptions used in constructing the reserve paths are in Table 1.)

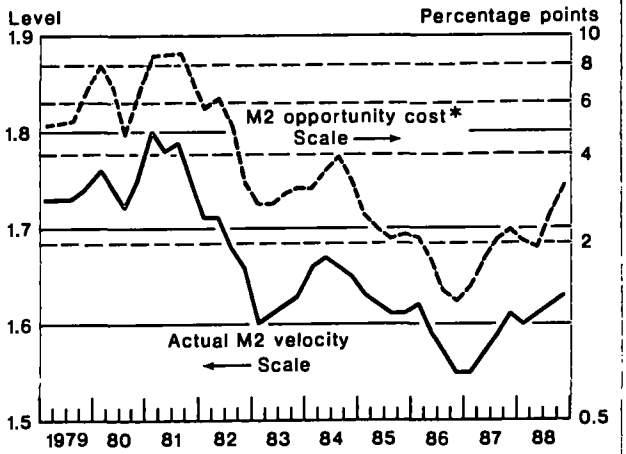
The borrowed reserve approach to policy implementation was embodied in the procedures followed, with some modifications, since 1983. The Desk has targeted average levels of nonborrowed reserves (NBR) to be held over two-week reserve maintenance periods. The NBR levels were chosen to be consistent with the degree of reserve pressure sought by the FOMC. Specifically, the Desk formulated its NBR objective by first estimating the total demand for reserves, consisting of the demands for required and excess reserves, and then subtracting from that demand an assumed level of discount window borrowing set by the FOMC. The remainder was the NBR objective. The Desk would attempt to achieve the NBR objective through its open market operations, subject to uncertainties about reserve demand and the impact of various "operating factors" on the availability of NBR. The assumed amount of borrowing was expected to be consistent with a particular range of money market firmness. Because the Federal Reserve discourages banks from engaging in heavy or frequent discount window borrowing, a higher level of borrowing has tended to be associated with firmer money market rates: The reduction in the supply of NBR that corresponded to a higher assumed level of borrowed reserves would cause banks to bid more aggressively for reserves in the federal funds market, driving up the funds rate. With NBR scarcer, some of the banks would be unable to satisfy their needs in the funds market, and would ultimately be forced to come to the window.[10]

Thus, borrowing and the spread of the funds rate over the discount rate have tended to move up and down together, except when there has been a shift in the willingness of banks to approach the discount window. Banks appeared to be more reluctant to borrow after the stock collapse; that is, they would not borrow a given aggregate amount at the window unless money market conditions were firmer than would have been necessary to induce that level of borrowing before October 1987. As a consequence, strict adherence to the NBR objective implied by a given anticipated borrowing level would have forced federal funds to trade above the range anticipated by the FOMC, making it less desirable to follow the standard borrowed reserve procedure. Given this shift in the relationship between discount window borrowing and money market firmness, special flexibility was needed to enable the Desk to steer a course that more closely reflected the degree of restraint sought by the Committee.

This flexibility was demonstrated, for example, in the January 27 and February 10 maintenance periods. With daily borrowing consistently running below the intended level and the money markets unexpectedly firm, the Desk accommodated the low borrowing by supplying NBR in excess of the objective. (Actual reserve data appear in Table 2.) This discrepancy between the behavior of the money market and discount window borrowing temporarily disappeared after the two-stage reduction in the assumed level of bor-

Chart 6

M2 Velocity and Opportunity Cost



*Two-quarter moving average, calculated from an average of Treasury bill, commercial paper, and large CD rates.

[10]For a more detailed description of the borrowed reserve procedure, see Brian F. Madigan and Warren T. Trepeta, "Implementation of U.S. Monetary Policy," in *Changes in Money-Market Instruments and Procedures: Objectives and Implications*, Bank for International Settlements, March 1986.

Table 1

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

Date of Meeting	Specified Short-Term Growth Rates† M2	M3	Borrowing Assumption for Deriving NBR Path	Discount Rate	Committee Preference	Prospective Reserve Restraint Modifications: Guidelines for Modifying Reserve Pressure	Factors to Consider for Modifications (In Order Listed) 1	2	3	4	5
	(Percent)		(Millions of Dollars)	(Percent)							
12/15 to 12/16/87	November to March 5	6	300 250 on 1/28	6.00	‡Sought to maintain the existing degree of pressure on reserve positions	A somewhat lesser or somewhat greater degree would be acceptable	Conditions in financial markets	Strength of the business expansion	Indications of inflationary pressure	Developments in foreign exchange markets	Behavior of the monetary aggregates
2/9 to 2/10/88	November to March 6 to 7	6 to 7	250 200 on 2/11	6.00	‡Sought to maintain the slightly reduced degree of pressure on reserve positions adopted in recent days	A somewhat lesser or somewhat greater degree would be acceptable	Conditions in financial markets	Strength of the business expansion	Indications of inflationary pressure	Developments in foreign exchange markets	Behavior of the monetary aggregates
3/29/88	March to June 6 to 7	6 to 7	200 300 on 3/30 400 on 5/9	6.00	‡Sought to increase slightly the degree of pressure on reserve positions	A somewhat greater or somewhat lesser degree would be acceptable	Conditions in financial markets	Strength of the business expansion	Indications of inflationary pressure	Developments in foreign exchange markets	Behavior of the monetary aggregates
5/17/88	March to June 6 to 7	6 to 7	400 500 on 5/25 550 on 6/22	6.00	Sought initially to maintain the existing degree of reserve pressure but anticipated that a slight increase would be appropriate in weeks ahead, depending on fectors cited	Later in intermeeting period, a somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Conditions in financial markets	Strength of the business expansion	Indications of inflationary pressure	Developments in foreign exchange markets	Behavior of the monetary aggregates
6/29 to 6/30/88	June to September 5 1/2	7	550 600 on 7/1§	6.00 6.50 on Aug. 9	Sought to increase slightly the existing degee of pressure on reserve positions	A somewhat greater degree would be acceptable; a slighlly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Developments in foreign exchange and domestic financial markets	Behavior of the monetary aggregates	
8/16/88	June to September 3 1/2	5 1/2	600	6.50	Sought to maintain the existing degree of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets	
9/20/88	August to December 3	5	600	6.50	Sought to maintain the existing degree of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets	

†No specific targets were established for M1 in 1988.
‡Factors calling for special flexibility:
— Sensitive conditions in financial markets.
— Uncertainties in the economic outlook.
§On August 8, the borrowing assumption was increased to $700 million, but it was returned to $600 million the next day when the discount rate was raised.

Table 1

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

Date of Meeting	Specified Short-Term Growth Rates M2	M3	Borrowing Assumption for Deriving NBR Path	Discount Rate	Committee Preference	Prospective Reserve Restraint Modifications: Guidelines for Modifying Reserve Pressure	Factors to Consider for Modifications (In Order Listed) 1	2	3	4	5
	(Percent)		(Millions of Dollars)	(Percent)							
11/1/88	September to December 2 1/2	6	600 400 on 11/22	6.50	Sought to maintain the existing degree of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets	
12/13 to 12/14/88	November to March 3	6 1/2	400 500 on 12/15	6.50	Sought to increase somewhat the existing degree of pressure on reserve positions	A somewhat greater degree would be acceptable; a slightly lesser degree might be acceptable	Indications of inflationary pressure	Strength of the business expansion	Behavior of the monetary aggregates	Developments in foreign exchange and domestic financial markets	

rowing from $300 million to $200 million in late January and early February. Though the reduction was partly in recognition of the tendency for borrowing to fall short of its allowance, it also reflected concerns that the economy could still be fragile.

However, the preponderance of economic data received in March tended to support the view that growth was being sustained. It also showed a rebound in the monetary aggregates from the sluggish rates of late 1987. Responding to potential pressures on capacity and prices, the FOMC embarked on a series of modest increases in the degree of reserve restraint that continued, with some pauses, through the end of the year. From a level of $200 million just prior to the March meeting, the assumed level of borrowing was raised in five steps to $600 million after the June meeting. This incremental firming of reserve pressures was punctuated by the August 9 increase in the discount rate from 6 to 6½ percent.

Once again during these episodes of firming in spring and summer, the relationship between the level of borrowing specified by the FOMC and the behavior of the federal funds rate deviated somewhat from expectations. As in the period immediately after the stock market collapse, firmer-than-expected money market conditions emerged even when borrowing was lower than intended. The discrepancy was attributed, in part, to the role of market interest rate expectations. Participants observed economic data releases that suggested robust growth and, on the basis of their understanding of Federal Reserve policy, anticipated further restraint by the FOMC and wider spreads between the federal funds rate and the discount rate. Consequently, they conserved their borrowing privileges and pressured rates higher even before monetary policy was changed. As they drove up the current funds rates, the perceived advantage of postponing borrowing tended to disappear. Even if a discount rate increase were anticipated, banks might extend the maturity of their market borrowing, forcing up rates on term federal funds, term repurchase agreements (RPs), and CDs, with some feedback to overnight rates. This tendency for market expectations to send rates above the range anticipated by the Desk was particularly evident in June and July.

In part, the Desk responded to these expectations-driven increases in money market rates by meeting reserve needs promptly within each maintenance period, while still attempting to achieve the NBR path. By aggressively providing reserves within the borrowed reserve framework, the Desk could deflate some of the money market pressures and thus avoid fostering misperceptions of the stance of policy. Beginning with the May meeting, when the Committee completed its shift in focus from financial market to economic conditions, the Desk pursued the borrowed reserve objectives while resisting less vigorously the pressures lifting money market rates. Subsequent decisions to firm policy tended to validate the upward pull of market psychology on rates. The anticipated degree of money market firmness did not catch up to actual market rates until the August 9 increase in the discount rate.

For a time after the discount rate hike, consistent behavior of money market rates and bank borrowing appeared to have been restored. However, as the seasonal component of discount window borrowing waned in the fall (somewhat later than in recent years), banks again appeared to be reluctant to approach the discount window. Indeed with hindsight, the apparent restoration of the historical borrowing-funds rate relationship after the discount rate increase may have been attributable to the heavy use of the seasonal borrowing facility. At its peak in the October 5 maintenance period, seasonal borrowing averaged $433 million per day, compared with peak period averages of $298 million in 1987 and $152 million in 1986, when spreads were lower.[11] For the year, seasonal borrowing averaged $235 million per day, compared with $164 million in 1987 and $87 million in 1986. As seasonal borrowing fell off its unusually high levels by the fall, the pattern of light adjustment borrowing came to dominate adjustment and seasonal borrowing.

By late October, the difference between the level of the federal funds rate that would have been expected to correspond to a given level of borrowing and the observed federal funds rate grew too large for the Desk to reconcile by "front loading" reserves within each maintenance period. Hence in the October 19, November 2, and November 16 periods, the Desk accepted borrowing somewhat below the $600 million allowance, believing the lower levels to be more consistent with the degree of restraint sought by the FOMC.[12]

[11]Seasonal borrowing tends to increase as the federal funds-discount rate spread rises, though it is not as responsive to spread changes as adjustment borrowing.

[12]Adjustment and seasonal borrowing averaged $523 million and $422 million, respectively, in the October 19 and November 2

Table 2

1988 Reserve Levels

(In 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 & 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. 13	62,805	62,932	1,307	1,156	64,112	1,460	62,653	62,629	63,516	485
27	60,554	60,581	1,288	1,362	61,842	176	61,666	61,768	61,192	332
Feb. 10	59,366	59,452	1,282	1,302	60,648	143	60,505	60,611	60,008	144
24	58,700	58,771	1,087	1,060	59,787	193	59,594	59,638	59,421	232
Mar. 9	58,607	58,636	966	897	59,573	282	59,291	59,251	59,286	255
23	59,182	59,139	911	985	60,093	239	59,854	59,886	59,807	1,685
Apr. 6	59,696	59,679	917	884	60,613	323	60,290	60,241	60,229	2,494
20	62,145	62,040	686	798	62,831	341	62,490	62,497	62,587	3,278
May 4	60,796	60,711	1,067	1,215	61,862	437	61,425	61,489	61,361	1,787
18	59,959	59,962	901	961	60,859	377	60,482	60,546	60,459	1,798
June 1	58,943	58,992	1,182	1,229	60,125	582	59,543	59,639	59,438	2,538
15	61,563	61,635	696	686	62,258	479	61,780	61,843	62,120	2,986
29	60,692	60,663	1,060	1,105	61,752	520	61,233	61,249	61,041	2,138
July 13	62,599	62,685	861	754	63,460	1,316	62,144	62,123	63,082	2,340
27	61,085	61,105	1,203	1,293	62,288	605	61,683	61,793	61,453	2,663
Aug. 10	61,309	61,408	796	715	62,104	591	61,513	61,532	61,758	2,749
24	60,954	61,015	981	1,025	61,935	574	61,361	61,466	61,421	2,671
Sept. 7	60,705	60,744	1,123	1,049	61,827	611	61,216	61,182	61,265	2,482
21	61,896	61,921	783	795	62,679	896	61,783	61,819	62,269	2,075
Oct. 5	60,442	60,372	1,148	1,310	61,590	734	60,856	60,947	60,704	1,704
19	61,509	81,461	975	1,050	62,484	523	61,961	61,988	61,775	1,681
Nov. 2	60,260	60,263	1,128	1,149	61,387	422	60,966	60,990	60,546	1,931
16	61,562	61,487	1,603	1,741	63,165	395	62,770	62,833	61,834	2,838
30	61,160	61,238	635	555	61,795	699	61,096	61,093	61,843	1,863
Dec. 14	62,515	62,473	976	1,099	63,491	485	63,006	63,087	63,096	1,529
28	62,550	62,549	1,081	1,162	63,631	379	63,252	63,332	63,078	968

†As of final Wednesday of reserve period.

In recognition of the Desk's difficulty in reconciling the assumed level of borrowing with money market rates, the Committee resolved in its November 22 telephone consultation call to adapt to the shift in the borrowing relationship by allowing for just $400 million of borrowing. But because some reports suggested the economic expansion retained considerable strength after an apparent moderation of growth, the Committee chose the new borrowing level with the view that it would be associated with a slightly firmer money market than anticipated before the change. Against a background of strong economic reports, the degree of reserve restraint was again notched upwards in December. Once more, however, it was difficult to anticipate the interest rate levels that would likely be associated with a particular allowance for discount window borrowing. On top of uncertainties about the basic relationship, end-of-year pressures tended to force money market rates higher.

The uncertain borrowing-federal funds rate relationship

Empirical evidence suggests that the changes in the borrowing relationship did not begin in 1988. Examination of the relationship back to 1984 shows that a series of shifts has, on balance, resulted in reduced discount window borrowing for given spreads of the funds rate over the discount rate. The first downward shift occurred in conjunction with the crisis at Continental Illinois Bank in the spring and summer of 1984 and lasted several months.[13] Estimates of the magnitude of this shift, which proved to be temporary, suggest that at a particular value of the spread, the willingness of other banks to borrow declined by roughly $350 million to $450 million. The borrowing relationship appeared to return to normal that fall as Continental's funding needs stabilized. The next downward shift, with an estimated magnitude of $200 million to $350 million, appears to have occurred early in 1986 and has not been satisfactorily explained. A further $100 million to $125 million downward shift followed the October 1987 stock market crash. Though that shift initially appeared to be a product of the temporarily unsettled financial conditions following the crash, it persisted and was followed by yet another sizable downward shift in the second half of 1988.

Indicative of cumulative changes in the relationship, the spread between the funds rate and the discount rate averaged 134 basis points in 1988, compared with an average spread of 84 basis points over the previous four years. At the same time, adjustment and seasonal borrowing averaged only $531 million in 1988, less than the $550 million average of the 1984-87 period (Chart 7). To date, the downward shifts in borrowing apparently have been concentrated in the adjustment component, which averaged $294 million in 1988, well below the $401 million average over the 1984-87 period. Disaggregating adjustment borrowing by size of depository institution reveals shifts in the relationships for all classes. However, the 1988 shift was most pronounced at commercial banks with less than $1 billion of deposits. The shift in borrowing at small banks was particularly surprising because small-bank behavior had been relatively predictable before 1988. Through 1988, commercial banks generally have accounted for almost all of the adjustment and seasonal borrowing.[14]

In the past, some shifts in the borrowing relationship have been easy to understand. For example, during the Continental Illinois crisis in 1984, other banks avoided the window, fearing that any borrowing might become public and taint their reputations.[15] More recently, the stock market crash created a general feeling of unease in the financial system. Nevertheless, it is not clear why the ensuing shift in the borrowing relationship persisted once the sense of crisis abated, or why a further change occurred late in 1988. Banks may have felt vulnerable to financial shocks, but this hypothesis is not totally convincing. The commercial bank failure rate was high in 1988, but only modestly above the 1987 pace, and the failure rate did not suddenly increase toward year's end. Though failures of thrift institutions soared in 1988, particularly in the last half of the year, the problems of the thrift industry did not appear to

Footnote 12 continued
periods. In the November 16 period, borrowing averaged just $395 million despite a computer problem at a major money center bank that caused borrowing to bulge to $2 billion on one day.

[13]For the purpose of developing the estimates referred to in this section, adjustment borrowing by Continental Illinois during the spring of 1984 has been excluded. The borrowing by the Bank of New York in November 1985 that resulted from an operational problem has also been excluded. In some of the econometric exercises, other special situation borrowing was removed.

[14]Savings and loans have traditionally turned first to their district Home Loan banks. Credit unions have not borrowed significant amounts. There was some thrift institution borrowing in 1985 during the crises of confidence affecting privately insured Ohio and Maryland thrifts.

[15]As it faced a growing crisis of confidence in May 1984, Continental Illinois made heavy use of the discount window. Because of the size of the borrowing and the news stories reporting that the bank was facing deposit outflows, the public surmised that Continental was responsible for the bulge. Once its borrowing was transferred to extended credit in June, the bank provided daily reports on what it had borrowed to a group of "safety-net" banks. Other banks with publicized problem loans avoided going to the window for several months thereafter for fear that such an action would be interpreted as a sign of trouble. The Federal Reserve does not reveal the identity of borrowers, but banks do worry that the public might guess the identity of a large borrower or learn it through some other means.

weaken confidence in commercial banks.[16] It is possible that banks in the Southwest felt a particular reluctance to borrow even if they were in reasonable financial condition. The economic stresses in the region stemming from weakness in the oil and real estate sectors, as well as the problems of both banks and thrifts, were widely publicized.

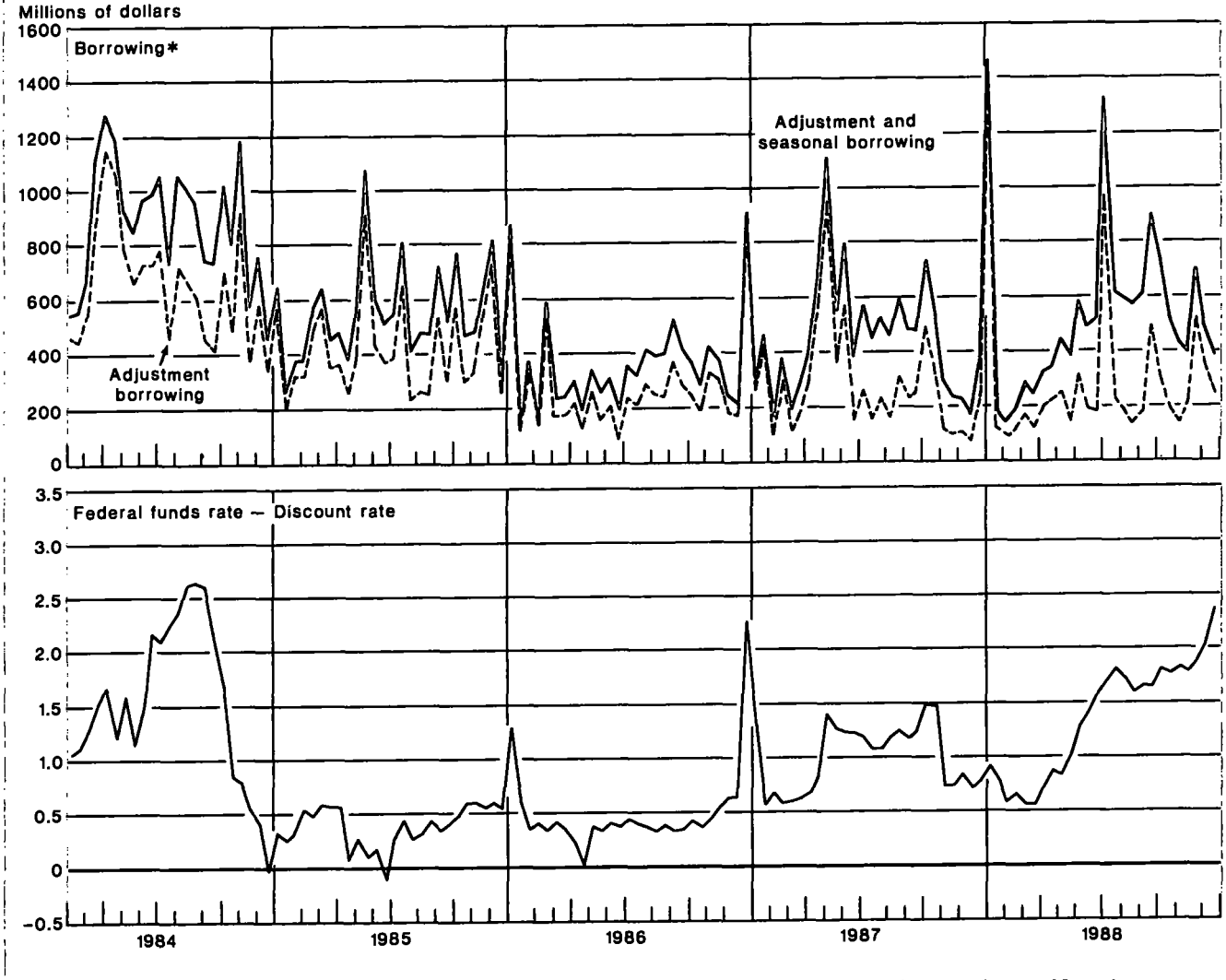
[16]The spread between the prices of Treasury and Eurodollar futures contracts (TED), which tends to widen when concerns about commercial bank solvency intensify, narrowed somewhat during 1988.

Open market operations and reserve management

As in previous years, the Desk took account of both the expected duration and the day-to-day pattern of reserve needs in its implementation of the NBR objectives. It considered the projected reserve needs for the maintenance period in progress and a few subsequent periods in choosing between permanent and temporary reserve operations. If a sizable need to add (or, conversely, to drain) reserves was projected for a few consecutive maintenance periods, the Desk would typically

Chart 7

Borrowing and Federal Funds — Discount Rate Spread



*Excludes special situation borrowing by Continental Illinois in the maintenance periods ended May 9, May 23, and June 6, 1984 and by Bank of New York in the period ended December 4, 1985.

opt to make a portion of the adjustment with outright purchases or sales of securities.

When the Desk made outright purchases of Treasury securities in 1988, it leaned toward coupon issues, rather than bills, though the tilt was less pronounced than in 1987. In both years, operations departed from the previous pattern of relatively heavy bill purchases. Two of the three coupon purchases were made in the first half of the year when there was a technical shortage of bills in the market because the Treasury was paying them down in most of its weekly auctions. (Over the year as a whole, the Treasury increased the net supply of bills.) On net, the Desk added $9.7 billion of Treasury coupon issues and $5.4 billion of bills to its portfolio. Meantime, holdings of federally sponsored agency issues decreased by about $600 million.[17] The average maturity of System holdings continued to shorten in 1988, as the Desk's purchases tended to be concentrated in shorter maturity coupon issues, both in the market and in refunding operations.

The $14.5 billion increase in the portfolio, which brought the year-end level to $245.8 billion, was nearly a third less than the record increase of 1987. The need for permanent reserve additions was reduced by a smaller net drain of reserves from operating factors and a smaller annual increase in required reserves. As usual, the rise in currency absorbed the largest quantity of reserves, but the $17.2 billion increase in 1988 (December over December) drained fewer reserves than the $18.1 billion increase in 1987. Since net foreign currency intervention took the form of dollar sales in 1988 (that is, purchases of foreign currencies), foreign exchange holdings added $2.2 billion of reserves, in contrast with a $1.9 billion drain of reserves in 1987 when intervention was generally in support of the dollar. The financial troubles of depository institutions in the Southwest prompted an increase in extended credit borrowing in 1988 that added $760 million to reserves, in contrast with just $180 million in 1987.[18] Required reserves rose by $1.6 billion, after increasing by $2.9 billion in 1987.[19]

When the Desk chose to meet reserve needs through temporary transactions, the timing of its operations depended on the intraperiod distribution of needs. The Desk sought to avoid extraordinary reserve surpluses or deficiencies on individual days since both held the potential to induce movements in the funds rate that could give misleading signals about the intent of policy. Moreover, a sizable daily reserve deficiency might leave the banking system with inadequate reserves for transactions clearing purposes and force spikes in discount window borrowing that could preclude achieving the path level. The holding of these Federal Reserve balances for use in handling funds transfers was motivated by the requirement that banks avoid overnight overdrafts and keep "daylight" overdrafts below levels specified by the Federal Reserve.

The Desk made comparatively heavy use of temporary transactions during the year, and favored those for one, rather than several, business days.[20] Operations frequently responded to large day-to-day variations in reserve availability. It was also recognized that short-term transactions might at times help provide clearer policy guidance to financial market participants. Early in the year, the Desk was sensitive to residual financial market fragility after the October 1987 crash. Later, uncertainties sometimes attended a change in the policy stance. Market participants often interpreted the use — or eschewance — of short-term transactions as evidence in judging whether the policy stance had changed. Toward the year's end, the active use of overnight RPs helped alleviate pressures associated with the increased reluctance to borrow.

Over the year, the Desk arranged System RP transactions on 51 occasions for a total of $210 billion. In addition, it arranged 85 rounds of customer-related RPs, totaling $143 billion. Comparable figures for 1987 were 68 rounds of System RPs, for $395 billion, and 85 rounds of customer RPs, for $155 billion. The Desk relied more heavily on temporary transactions to withdraw reserves in 1988 than in 1987, when a sale of Treasury bills in the market had met some of the need to drain reserves early in the year. The Desk arranged 22 rounds of matched sale-purchase agreements in the market, for a total of $63 billion.

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

[17]The Desk normally rolls over maturing federally sponsored agency issues. Its holdings declined when issues were called, or when they matured and no eligible replacement was available.

[18]The extended credit facility is provided to institutions facing financial difficulties. It is treated as nonborrowed, rather than borrowed, reserves for policy implementation purposes since it is not undertaken in response to general conditions of reserve availability established by the Federal Reserve.

[19]The phasing in of requirements on nonmember depository institutions, which added to required reserves over the 1980-87 period, was completed in September 1987. Annual indexing of the zero and 3 percent reserve tranches continues to reduce reserve requirements — by an estimated $750 million in 1988.

[20]The volume of temporary market transactions was substantially below the extraordinary level of 1987 that had been swollen by heavy use of System RPs after the larger-than-expected inflow of taxes in late April and early May and again after the stock market crash.

banking system's desired excess reserve balances. On the supply side, revisions to estimated sources and uses of nonborrowed reserves other than open market operations, or "operating factors," could change the reserve outlook. In both cases, revisions late in a maintenance period were especially difficult to deal with since they could necessitate very large reserve injections or drains.

The accuracy of required reserve forecasts improved in 1988 relative to the previous year. The mean absolute error in forecasting required reserves for each maintenance period on the first day of the period was around $300 million in 1988, compared with roughly $400 million in 1987.[21] This improvement came despite roughly equal mean absolute period-to-period changes in required reserves during the two years. Forecasts became more accurate during maintenance periods as deposit data became more complete; the mean absolute prediction error fell to about $150 million to $200 million by the middle of each period, and to around $70 million by the last day. Still, sizable revisions occasionally took place after a maintenance period ended and were particularly troublesome because their impacts could not be offset by open market operations.

Though positive and negative beginning-of-period forecast errors roughly offset each other, there was some tendency to underestimate required reserves in June and July and a pronounced tendency to overestimate required reserves from the second half of July until the first half of November. Since estimates of required reserves were formed by applying a reserve ratio to estimated levels of transactions deposits, these errors reflected under- and overestimates of transactions deposits.

Excess reserves were also somewhat more predictable in 1988; both sets of beginning-of-period mean absolute forecast errors were about $160 million in 1988, compared with around $180 million to $240 million in 1987. In part, this improvement may have been attributable to a roughly 25 percent decline in the mean absolute period-to-period change in excess reserves in 1988. Had the error calculations excluded the November 16 period, in which a major bank's wire transfer problem caused excess reserves to soar to $1.6 billion, the average absolute error would have been about $20 million lower. The other particularly large forecast errors occurred in the first two periods of the year, when excess reserves ran well above expectations, and in the November 30 period, when excess reserves fell far short of the expected level. On average, there was a modest tendency to underestimate excess reserves.[22]

Unlike the preceding several years, 1988 saw little significant growth in the annual average level of excess reserves. Two factors appear to explain the leveling off of excess reserves. First, the phase-in of reserve requirements for nonmember institutions was completed in 1987. The extension of requirements to nonmembers forced those institutions that could not meet all of their requirements with vault cash to hold Federal Reserve balances. Since most of these nonmembers do not closely monitor reserves, the holding of these balances tended to boost aggregate excess reserves. Second, as transactions flows have increased since the late 1970s, institutions have held larger balances at the Federal Reserve in order to avoid end-of-day overdrafts; this precautionary component of reserve balances also tended to raise excess reserves. In 1988, the volume of transactions over the Fedwire system grew much more slowly than in recent years.

Since large banks tend to monitor their reserve balances closely in order to avoid holding non-interest-bearing excess reserves, their average holdings of excess reserves over a year are typically close to zero. These banks generally make use of the carryover privilege, under which banks can apply a portion of the excess reserves held in one period to their requirements in the following period; carryovers tended to produce a sawtooth pattern of excess reserve holdings at large banks. On the other hand, smaller institutions generally do not have the resources to monitor their reserve positions accurately and usually hold positive levels of excess reserves. Thus in 1988, as in previous years, events that tended to shift the distribution of reserves toward smaller banks often raised the aggregate level of excess reserves. The usual pattern of high excess reserves in the early part of the year held true as small banks failed to adjust their reserve holdings adequately to the seasonal decline in required reserves. Furthermore, vault cash held in December 1987 boosted maintained reserves in early 1988, since there is a delay of several weeks between the time when vault cash is held and when it is applied to meeting reserve requirements.

The task of forecasting the impacts of operating fac-

[21]The Trading Desk uses forecasts of required reserves, excess reserves, and operating factors made by both the Federal Reserve Bank of New York (FRBNY) and Board staffs. When a range of forecast errors is given in the following discussion, it reflects varying degrees of success in forecasting reserve measures by the two staffs. A single figure indicates that the errors were similar for both sets of forecasts. Forecast errors of operating factors reflect only FRBNY estimates.

[22]These 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.

tors on reserve availability was also more manageable in 1988 than in 1987. The improvement in forecast accuracy mainly reflected the more predictable behavior of the Treasury's Federal Reserve balance. The Treasury's balance had been particularly difficult to forecast in 1987 because of the uncertain impact of the Tax Reform Act of 1986 on tax flows and of debt ceiling crises on the timing of the Treasury's debt offerings. Some of the largest forecast errors in 1988 were associated with uncertainty about tax collections in April, June, and September, but the mean absolute error in predicting the average level of the Treasury balance over each two-week maintenance period, based on the beginning-of-period forecast, fell to $710 million in 1988, compared with an unusually high $965 million in 1987. However, after allowing for the diminished period-to-period variation in the Treasury balance, the forecast error was proportionately larger in 1988 than in 1987.

One possible consequence of the unpredictability of the Treasury's balance is that an unexpectedly large net outflow of funds could result in an overdraft by the Treasury of its Federal Reserve account. Because the Federal Reserve has no legal authority to lend directly to the Treasury, such an overdraft would be impermissible. But as Treasury flows have increased over the years, the likelihood of such overdrafts has grown. To reduce the possibility of an inadvertent overdraft, the Treasury raised the "target" level of its Federal Reserve working balance from $3 billion to $5 billion in October. If the Treasury anticipates that its Federal Reserve balance will fall below the $5 billion level, it can "call" funds from the Treasury Tax and Loan (TT&L) accounts at depository institutions to bring the balance up to the target level. Similarly, if the Federal Reserve balance were projected to exceed $5 billion, the Treasury could directly invest funds into the TT&L accounts, providing that these accounts were not already at their capacity.[23]

Forecast errors for other operating factors were fairly typical of those in recent years. Among the more important sources of uncertainty, the mean absolute beginning-of-period error in predicting Federal Reserve float (including "as-of" adjustments to correct errors made on earlier transactions) was about $270 million in 1988, somewhat below the 1987 figure. The mean error in forecasting currency in circulation was also around $270 million, again a bit below the 1987 level. One factor, extended credit borrowing, proved significantly more difficult to forecast in 1988 than in recent years. As the daily average level of extended credit borrowing rose from $305 million in 1987 to $1.8 billion in 1988, the mean absolute forecast error rose from just $55 million to $350 million. Overall, the beginning-of-period mean absolute error in predicting the impact of all operating factors on each maintenance period was $1.0 billion in 1988, compared with $1.3 billion in 1987. However, if one considers the mean absolute error as a proportion of the mean absolute period-to-period change in market factors, then forecast accuracy was quite similar in the two years, and similar to the record of most recent years. By the last day of each period, when the Desk could still incorporate estimates of the impact of operating factors on reserve availability in its decisions, the mean absolute forecast error in predicting the total contribution of market factors was roughly $50 million, down from about $90 million in 1987.

[23] Since depository institutions (DIs) must pay interest on and fully collateralize TT&L funds, DIs set limits on total capacity based on their profitable use of the funds and the availability of collateral. DIs that receive funds in excess of their capacity limits remit those funds to the Treasury's Federal Reserve balance. In 1988, the Treasury's Federal Reserve balance rose above its targeted level because TT&L accounts were at their roughly $30 billion capacity on about 45 business days.