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The Role of the Credit Slowdown in the Recent Recession

Introduction

On February 12, 1993, the Federal Reserve Bank of New York held a colloquium on the recent slowdown in credit. Two papers were prepared for the colloquium and each paper was reviewed by three discussants. A brief overview of the papers and the comments of the discussants is presented below. The full text of the two papers and of the discussants' comments follows the overview.

In the first paper, "**Perspective on the Credit Slowdown**," **Richard Cantor** and **John Wenninger** examine the slowdown in credit from three points of view: (1) a discussion of the events that led up to the credit slowdown, (2) a comparison of recent events with earlier credit crunch episodes, and (3) a consideration of the credit cycle model developed by Irving Fisher and Hyman Minsky and its applicability to the recent slowdown. Each of these approaches provides some perspective on the events of 1989-91 and highlights how demand and supply side factors can interact over the business cycle to produce a slowdown in credit. The discussants for the paper were Benjamin Friedman, Allen Sinai, and Albert Wojnilower.

Benjamin Friedman concludes that while it is possible to document the sequence of events in the 1980s and early 1990s, economists have not adequately explained why the large shifts in leverage ratios occurred. As a result, economists are put in the uncomfortable position of having to resort to an explanation that emphasizes changes in attitudes toward debt. Friedman contends that much of what happened in the 1980s could not have resulted from the financing of a large increase in new investment, but rather resulted from a massive increase in leverage that poured billions of dollars "into acquisitions, leveraged buyouts, stock buybacks, and other forms of equity paydowns" for reasons, as noted earlier, that have yet to be clearly articulated.

In his remarks, **Allen Sinai** argues that this recent episode followed the conventional credit cycle pattern set by earlier credit crunches. He observes that tight money in 1988, strong demand for loans, accumulating debt, speculation and speculative finance, and subsequent asset and debt deflation—all elements of previous credit cycles—were present this time as well. Sinai also emphasizes that the credit crunch should be viewed as part of an endogenous process, with each episode differing from its predecessors only in its superficial features. A sophisticated financial system, according to Sinai, can amplify and extend the business expansion as well as contribute to the weakness in economic activity during the recession phase.

Albert Wojnilower, in contrast, argues that the recent "credit problem" was not mainly due to cyclical factors. Rather, he takes the position that regulatory actions have played an important role in the present credit squeeze, although there has not been a credit crunch in the traditional sense of a sharp credit shutdown, the type of event that often occurred in earlier business cycles. Wojnilower also outlines his views of the historical and future evolution of the banking system as a provider of payment, credit, and deposit services in a changing regulatory environment.

In the second paper, "**Credit in the Macroeconomy**,"

Ben Bernanke examines the theoretical reasons why credit creation can have implications for macroeconomic variables such as output, employment, and investment. His paper (1) surveys the literature on imperfect information in credit markets, (2) reviews the credit view of monetary transmission, (3) looks briefly at the phenomena of credit crunches and overleverage, and (4) concludes with a discussion of bank loans and recent economic performance. The discussants for this paper were David Jones, Hyman Minsky, and William Poole.

David Jones considers this latest "credit crunch" to be a new version of the phenomenon. Unlike earlier episodes, it was not triggered by a Federal Reserve move to raise interest rates above Regulation Q ceilings, a move that in the past induced disintermediation. Rather, this latest version reflected, Jones argues, the savings and loan debacle, the toughening of bank capital ratios, the debt excesses of the 1980s, the stock market collapse, and the bankruptcy of Drexel in February 1990. The puncturing of the financial bubble provided a fertile environment for a credit crunch and produced a "balance sheet" recession. Jones contends that this latest credit crunch demonstrates how powerful the credit channel can be when borrower confidence is shattered by a credit crunch that is "arbitrary, sudden, and unpredictable."

In his remarks, **Hyman Minsky** expresses doubt that any macroeconomic theory based on assumptions that money, credit, and finance are neutral or irrelevant can be of use to policy makers. He is also skeptical that the asymmetrical information approach is capable of producing a consistent model of the interaction of credit and economic activity at the micro and macro levels. Rather, Minsky stresses that a capitalist economy should be modeled in terms of interrelated balance sheets, payment commitments, and expected cash flows that link the past, the present, and the future. Capital assets are an important part of this process, in his view, because they yield income flows over time and can be pledged to obtain credit, and because demand for them often depends on external financing terms.

William Poole questions whether credit is an important determinant of the business cycle. In his comments, he argues that the credit view of the business cycle tends to confuse surface appearances with basic economic forces. He is critical of the tendency of some analysts to assume that the credit effects on individual agents have macroeconomic implications when in fact the credit effects may cancel out at the aggregate level. Poole concludes that it is difficult to make a convincing case that credit effects are a significant cause of the business cycle; in his view, the cycle is driven by unexpected changes in inflation and revisions in forecasts of future expected income flows.

Perspective on the Credit Slowdown

*by Richard Cantor and John Wenninger**

The recent recession and recovery have been marked by an unusually sharp slowdown or outright decline in many measures of credit extension. As in past business cycles, a primary cause of the credit slowdown has been the reduction in credit demand related to the general weakness in economic activity. A broad range of considerations, however, suggests that not all of the slowdown is due to the weak economy alone, leading many financial commentators to identify the recent period as a "credit crunch." It appears that the decline in credit growth can be explained in part by changes in the attitudes toward debt by both lenders and borrowers. These changes in attitude seem to be the direct and perhaps inevitable consequences of the credit excesses of the 1980s.

Some perspective on the current credit crunch can be gained by reading accounts of earlier credit crunch episodes. Albert Wojnilower, in his 1980 historical review of credit crunches, leaves the reader with two generalities concerning credit crunches:

> Prolonged periods of intense inflation, speculation, monetary restraint, and rising interest rates set the scene, but whether and when a weak link in the credit chain may snap in a vital place remains very much a matter of accident.
>
> Credit crunch by private accident is much more dangerous than credit crunch by regulatory design or even error but ... as crunch by design is ruled out, crunch by accident becomes more probable.[1]

These two citations quite naturally raise the question whether the most recent credit slowdown was in some sense unique. At first glance, it does not seem that the scene for the current credit slowdown was set by "intense inflation, speculation, monetary restraint, and rising interest rates," although some elements of speculation were present in the corporate equity and real estate markets, and short-term interest rates did rise in the late 1980s when inflation showed some signs of increasing. Nor is it possible to point to a single "private accident" such as the failure of Penn Central in 1970 that might have precipitated the current credit slowdown. Finally, because Regulation Q ceilings are no longer in place and reserve requirements have been reduced as part of the monetary policy easing process, it is difficult to argue that the same kind of "regulatory design" that curtailed liquidity in earlier episodes was behind this credit slowdown.[2]

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[1]Albert Wojnilower, "The Central Role of Credit Crunches in Recent Financial History," *Brookings Papers on Economic Activity*, 1980:2, p. 293.

[2]Indeed, Wojnilower in later work argues that this latest credit slowdown was the result of the overly vigorous application of international bank capital standards that forced banks to cut back on lending, and hence did not follow the typical postwar pattern in many respects. See Wojnilower's entry on "credit crunch," article 0309, in Peter Newman et al., eds., *The New Palgrave Dictionary of Money and Finance* (New York: Stockton Press, 1992). A similar

In this paper, we attempt to analyze this latest credit slowdown from three different perspectives: (1) a review of the forces that set the stage for the credit slowdown, followed by a discussion of the available statistics on the credit slowdown period itself; (2) a comparison with previous postwar credit crunches; and (3) an overview of the credit cycle model found in the work of Fisher and Minsky. We find that at a very general level this latest episode does seem to fit the broad credit cycle model outlined by Fisher, Minsky, and others. However, it does differ in some important respects from earlier postwar credit crunch episodes. The set of forces that created this most recent slowdown in credit built up over a somewhat longer period of time and appeared to be driven more by inflationary expectations than by actual inflation. In addition, financial innovation and deregulation not only contributed to greater debt burdens, but also created an environment in which shifts in the demand for and supply of credit could create some new or different problems. At the same time, technological advances fostered more intense competition among financial intermediaries as more of their traditional customers gained direct access to the money and capital markets. Finally, regulatory error in deregulating the thrift industry without imposing adequate supervision also contributed to the current situation, although the lag between the regulatory event and the effect on credit was rather long, in part because of political considerations. Nonetheless, when the thrift crisis came to resolution, a more cautious lending environment became apparent and other financial intermediaries came under increased public and private scrutiny as the potential "next problem."

The paper's first section details the factors that created the fragile situation preceding the slowing of credit growth in 1989-90 and then describes the slowdown period itself. The second section reviews the available empirical evidence on the likely sources of the slowdown. The third section assesses (1) the extent to which better inventory management might have made bank lending look unusually weak from the demand side, and (2) whether the regulators contributed to the reduction in bank lending from the supply side. The fourth section compares this most recent credit slowdown with earlier episodes and also attempts to show how the current episode can be explained within the broad credit cycle process analyzed in the works of Fisher, Minsky, and others. We have also attached an appendix defining the various terms used to describe changes in credit conditions, such as credit slowdown, credit crunch, and credit rationing. We note here, however, that throughout the main part of this paper we use "credit slowdown" to refer to the combined effects of both supply factors and demand considerations (including shifts in borrowers' perceptions of the wisdom of high leverage), and "credit crunch" to encompass just the supply-side effects.

I. Historical account of the credit slowdown

Four key developments in the recent credit cycle contributed at times to shifts in both the supply of and the demand for credit: (1) deregulation and innovation, (2) over-investment in commercial real estate, (3) a massive buildup of debt, and (4) the savings and loan crisis. Because these factors are closely interrelated, it is necessary to weave a story of causes and effects among these factors that ultimately leads to the credit slowdown beginning in 1989.

All four of these factors have origins that can be traced, at least in part, to the high rates of inflation in the late 1970s, rates that had both immediate and longer term consequences. In the late 1970s and early 1980s the more immediate effect of the rapid inflation was a period of high short-term interest rates that seriously damaged the highly regulated thrift industry because of the mismatching of the maturities of assets and liabilities. Moreover, the high level of interest rates and their extreme volatility spurred an increased emphasis on financial innovation that lasted through much of the 1980s and prompted a move toward the deregulation of financial intermediaries.[3]

The longer run effects of the high inflation of the late 1970s seemed to come through expectations based on the seemingly inevitable upward creep of inflation through the 1960s and 1970s and on a trend of higher peak rates of inflation in each successive business cycle. These developments made it seem reasonable to expect that high inflation could return at some time during the 1980s (Chart 1). Indeed, for much of the 1980s, real interest rates, calculated using actual rates of inflation, appeared extremely high, suggesting that long-term investors in financial instruments suspected that inflation might accelerate as it had done in previous expansions after abating temporarily during the reces-

Footnote 2 continued
view was taken by Richard Breeden and William Isacc in "Thank Basel for Credit Crunch," *Wall Street Journal*, November 4, 1992. Federal Reserve Chairman Alan Greenspan, by contrast, argues that this is too narrow an explanation and that other demand and supply factors probably were more important than the risk-based capital requirements. For more detail, see Greenspan, remarks before the Tax Foundation of New York, November 18, 1992.

[3]More detailed reviews of financial developments in the 1980s can be found in Thomas Simpson, "Developments in the U.S. Financial System Since the Mid-1970s," *Federal Reserve Bulletin*, January 1988; and M.A. Akhtar and Betsy Buttrill White, "The U.S. Financial System: A Status Report and a Structural Perspective," in C. Imbriani, P. Roberti, and A. Torrisi, eds., *Il Mercato Unico Del 1992: Deregolamentazione E Posizionamento Strategico Dell'Industria Bancaria in Europa* (Rome: Bancaria Editrice, 1991), pp. 515-42.

sions (Charts 1 and 2).

A high-inflation psychology, along with innovative debt instruments, increased the willingness and the ability of households and businesses to take on large amounts of debt and made investment in real estate and corporate equity appear highly attractive for investors.[4] In addition, the 1981 tax law on passive losses and accelerated depreciation often made investment in commercial real estate profitable on an after-tax basis, even if buildings would not be fully, or even partially, rented.[5]

These conditions also prompted lenders to switch from credit standards based on current cash flow and balance sheet strength to standards based on anticipated growth in cash flow or collateral price appreciation. Given the intense competition for earnings among financial intermediaries domestically and internationally, real estate on the East and West Coasts was in a boom phase that made this change in lending practices appear rational.

A relaxation of credit standards was also apparent for commercial lending that was not related to real estate. In the early and mid-1980s, takeover artists identified

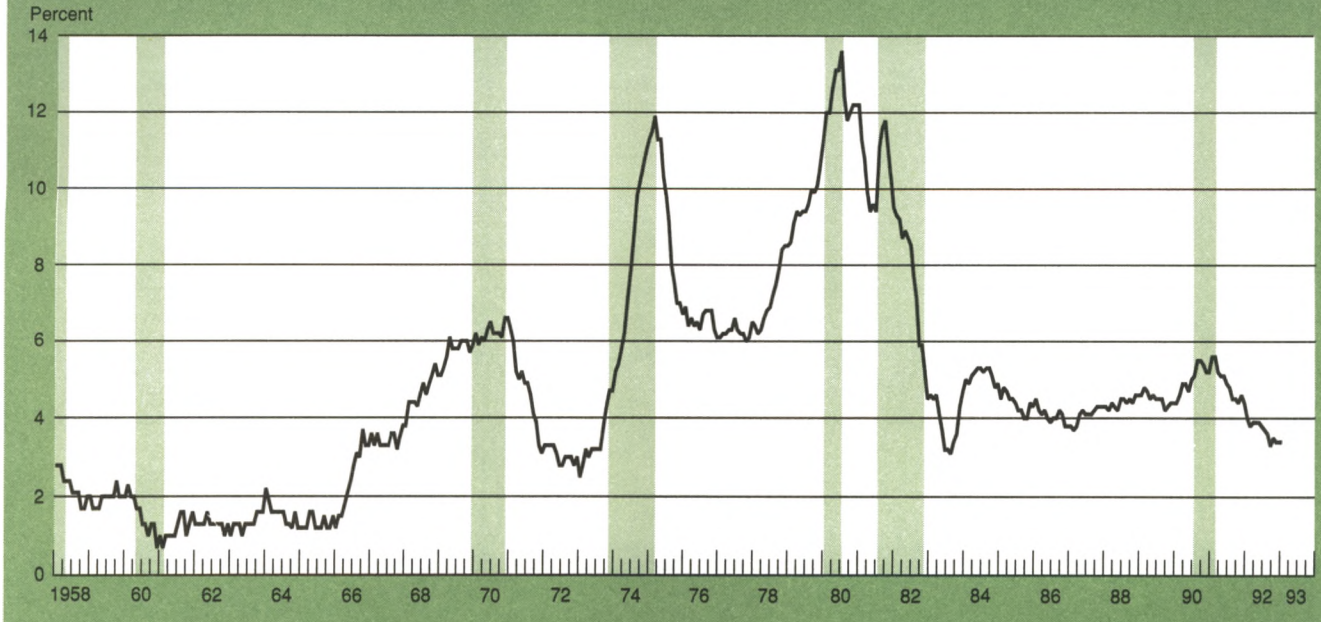
[4]Henry Kaufman has also argued that inflation (or inflationary expectations) is, by itself, too simple an explanation for the rapid growth of debt in the 1980s. He also notes the importance of a shift in attitude toward debt, financial innovation (including securitization), deregulation, financial internationalization, the tax structure, and the practice of debt prudence. Kaufman's views are summarized in "Debt: The Threat to Economic and Financial Stability," in *Debt, Financial Stability and Public Policy*, Federal Reserve Bank of Kansas City, 1986, pp. 15-26, and presented in more detail in Henry Kaufman, *Interest Rates, the Markets, and the New Financial World* (New York: Times Books, 1986). Apparently, however, not everyone is convinced by such arguments. Benjamin Friedman takes the position that "at least for the present, therefore, the most honest answer of why all this [debt acceleration] has happened *in the 1980s* is that nobody really knows." See Benjamin Friedman, "Changing Effects of Monetary Policy on Real Economic Activity," in *Monetary Policy Issues in the 1990s*, Federal Reserve Bank of Kansas City, 1989, p. 70.

[5]For a detailed analysis of the tax law changes, see James Poterba, "Tax Reform and the Housing Market in the Late 1980s: Who Knew What, and When Did They Know It?" in *Real Estate and the Credit Crunch*, Federal Reserve Bank of Boston, 1992. For an analysis of why real estate is susceptible to strong cycles even in the absence of tax incentives or disincentives, see Lynn Browne and Karl Case, "How the Commercial Real Estate Boom Undid the Banks," in *Real Estate and the Credit Crunch*. These authors refer to the real estate cycle as a "hog cycle"—that is, "overbuilding caused by an inelastic short run supply curve and elastic long run supply curve," combined with multiyear leases that distort price information.

Chart 1

Consumer Price Index Excluding Food and Energy

Change from Twelve Months Earlier



Source: U.S. Department of Commerce.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

companies with undervalued assets. These companies could be acquired with borrowed money and then sold back to the market at a profit. The maturing of the junk bond market and early leveraged buyouts propelled stock prices even higher, fulfilling the expectations of lenders that had placed their bets on asset price appreciation. By 1987 and 1988, buyouts were being transacted at prices so high that defaults would be inevitable unless assets could be sold off at inflated prices within a few years.[6] The public's faith in leverage also spread to the investment grade sector as many blue-chip corporations undertook enormous stock buyback programs.[7]

At the same time, competition among financial intermediaries intensified as advances in information technology reduced the advantage banks had held in making some types of loans, especially loans to highly rated corporations. As a result, banks—under pressure since the early 1980s because of poor earnings stemming from losses on less developed country (LDC) and energy loans—seemed almost overeager to make real estate loans and loans for highly leveraged transactions as their traditional high-quality business borrowers began to develop innovative ways to access the money markets directly and as nonbank lenders began to compete intensely for this component of the banking system's lending business and others.

Consequently, banks were not alone in extending large amounts of credit to finance commercial real estate investment and leveraged buyouts. Other intermediaries such as insurance companies and thrift institutions also lent large sums for these transactions. Insurance companies, it appears, became involved in junk bonds and real estate because of the need to earn higher yields after the deregulation of bank and thrift deposits created more competition for consumer savings.[8] In this environment, consumers unbundled the

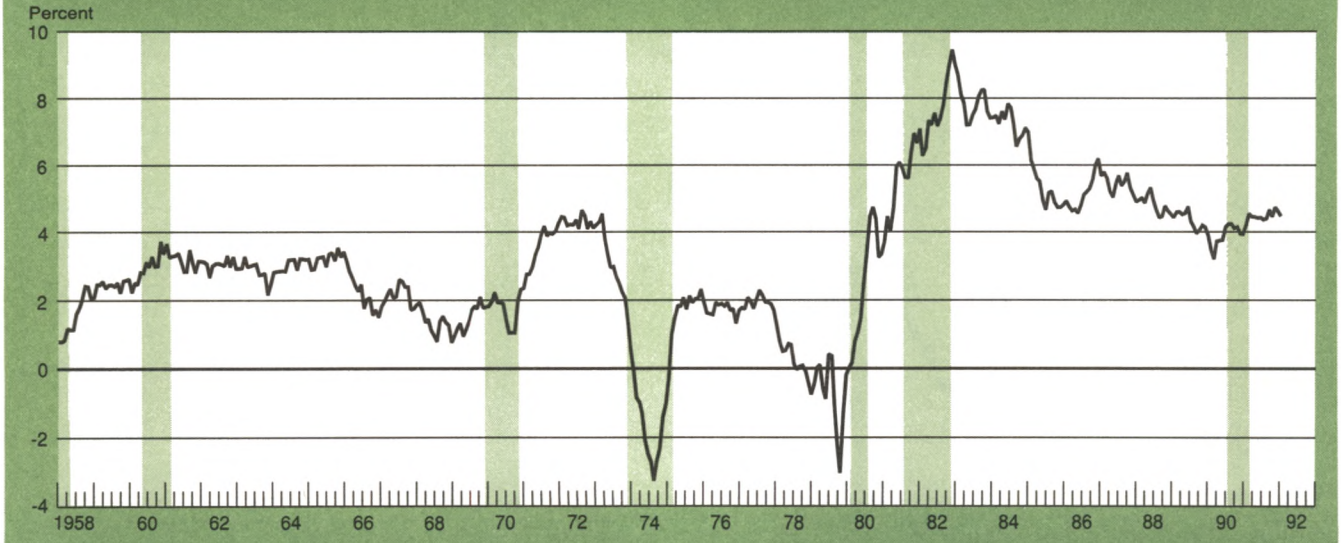
[6]The decline in credit quality of new-issue junk bonds and the trend towards merger-related transactions that entailed interest coverage below one are examined by Barrie Wigmore in "The Decline in the Credit Quality of Junk Bonds," *Financial Analysis Journal*, September-October, 1990, pp. 53-62.

[7]During the 1980s, the average cash flow coverage and leverage ratio deteriorated even within credit rating bands. For example, in the early 1980s, the median AAA corporation had a pretax interest coverage (including rents) of 8.38 percent and a total debt-to-capitalization ratio of 25.6 percent. By the end of the decade, these ratios were 4.79 and 35.3 percent, respectively. See Standard and Poor's Corporation, *Corporate Finance Criteria*, 1991, p. 68.

[8]For more background on the insurance industry, see Richard Kopcke and Richard Randall, eds., *The Financial Condition and Regulation of Insurance Companies*, Federal Reserve Bank of Boston, June 1991. For a more recent overview of the real estate

Chart 2

Real Aaa Corporate Bonds



Sources: Moody's Investor Service; U.S. Department of Commerce.

Note: Chart shows Aaa corporate bond rate less percentage change in consumer price index (excluding food and energy) from twelve months earlier. Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

insurance and savings components of whole life policies, prompting insurance companies to offer innovative products such as guaranteed investment contracts at interest rates reflecting market rates. Insurance companies also became active in the large-dollar pension fund annuity market, where they were required to pay highly competitive rates of return. As a result of these innovations and deregulation, insurance companies engaged in riskier lending in the 1980s than had been their practice earlier.

Likewise, many thrift institutions became active in risky commercial lending during the 1980s, but these institutions had little or no experience with such lending or with investing in some of the new instruments developed in the 1980s. The regulatory response to the weakened state of the thrift industry following the extremely high and volatile interest rates of the late 1970s and early 1980s had been to deregulate both the asset and liability sides of thrift balance sheets. Capital requirements, however, were not increased to reflect the greater risks thrifts could assume, or to reflect their inexperience in these new types of lending. Indeed, exempting weak thrifts from capital standards became common practice. As a result, the relative ease of entry into the thrift industry, combined with (1) the ability to finance a rapidly growing volume of risky real estate and other loans with government-insured deposits, and (2) decreasing amounts of regulatory oversight, produced the thrift crisis of the late 1980s.

Here again, financial innovation played a key part. On the liability side, brokered deposits, issued in insured units of $100,000 through a national brokerage market, enabled weak thrifts to tap the national money market with a managed liability. On the asset side, the high yields on junk bonds seemed very attractive to recently deregulated thrifts; at the same time, it became relatively easy to originate and sell mortgage loans, the traditional thrift asset, reducing the need for a specialized home mortgage lender.[9]

In general, for much of the 1980s the return to a high inflation environment seemed likely, and increased leverage, made easier by financial innovation, appeared to be a successful strategy. The value of certain assets—primarily commercial and residential real estate and stock prices—continued to increase, and inflation more generally seemed to be stuck in the 4 to 5 percent range, creating doubts about the resolve of the Federal Reserve to maintain its stated goal of reducing inflation over time through monetary control. The massive budget deficits of the 1980s also made investors uneasy about the prospects for continued progress toward greater price stability. Hence, during the 1980s, (1) heavy debt burdens, (2) weakened financial intermediaries, (3) an overdeveloped commercial real estate market, and (4) a crisis brewing in the thrift industry combined to create a rather fragile economic and financial environment in which both demand and supply factors could create a sharp slowdown in credit. In a sense, the process seemed to be a more or less direct result of earlier developments, and in some respects followed the Fisher-Minsky credit cycle discussed below.

By the late 1980s, expectations of further asset price increases began to appear unfounded, and in many markets real estate values were declining. A large supply of new buildings came on the market at about the same time that it became clear that the financial services industry was going through a sharp retrenchment. The stock market crashed in late 1987 and stalled for a period thereafter, and by the end of the decade the wisdom of some of the highly leveraged takeovers was very much in doubt from the perspective of both borrowers and lenders. The stock market experienced a smaller "crash" in late 1989, and the junk bond market collapsed when the deal for United Air Lines failed to come off. In addition, by the late 1980s, the thrift industry was going through a massive downsizing, and consumers and corporations were overextended with debt burdens made possible in part by the financial innovations developed during the 1980s. Moreover, with the onset of the recession, it began to appear that inflation was not likely to accelerate, as had been feared throughout much of the 1980s. Indeed, inflation showed signs of decelerating, making the debt burdens an even greater source of discomfort and prompting borrowers to take steps to reduce their dependence on credit. Finally, many of the tax incentives that had made commercial real estate investments profitable were removed, in many cases not only for new projects but existing projects as well. In short, the necessary elements of a sharp slowdown in credit from both the demand and the supply sides were all in place, and the recession and the credit slowdown fed on each other to produce a prolonged period of weakness in the U.S. economy. Under such circumstances, the unwinding of the excessive credit growth was bound to have both cyclical and systemic consequences.[10]

Footnote 8 continued
market and banks, insurance companies, and thrifts, see Donald Hester, "Financial Institutions and the Collapse of Real Estate Markets," in *Real Estate and the Credit Crunch*.

[9]For more detail on the thrift crisis, see Edward Kane, *The S&L Mess: What Really Happened?* (Boston, Mass.: MIT Press, 1985); and Lawrence White, *The S&L Debacle: Public Lessons for Bank and Thrift Regulation* (New York: Oxford University Press, 1991).

[10]Variations on this theme occurred in other countries. For more detail, see Susan Phillips, "Structure Shifts in the U.S. Economy," remarks at Widener University, Chester, Pennsylvania, October 1992;

Real estate problems in the Southwest had been evident as early as the mid-1980s. Real estate lending had been strong in that region, and the real estate market became overbuilt when the energy industry shifted from expansion into contraction. Banks in the region took losses first on their loans to the energy industry and subsequently on real estate lending. Next, the New England economy entered a recession in 1989, and many real estate projects that were based on continued strong growth in the regional economy were no longer viable. The collapse in New England real estate in turn added to the downward momentum of the regional economy. Problems with real estate loans soon became apparent in the entire Northeast, the East Coast more generally, and finally the West Coast. By the end of 1990, a large part of the nation's banking system was affected to some degree by the contraction of real estate values. The banking system was also hurt, though to a lesser extent, by problem loans for highly leveraged transactions as the recessionary environment caused some of the more marginal deals to prove less profitable than expected.[11]

Financial intermediaries and their regulators adjusted to the changing economic environment of the late 1980s and early 1990s. First, as regulators began to realize the seriousness of the real estate situation following the problems in the Southwest, they focused more on real estate loans in their exams and criticized loans whose collateral values had fallen, making full repayment improbable. Second, the pace of economic activity began to slow sharply, causing lenders to reassess the riskiness of certain types of loans, particularly for those firms and consumers that had acquired heavy debt burdens during the 1980s. Third, banks were obliged to increase their loan loss reserves for a growing volume of classified assets, and therefore had less capital available to finance asset expansion. Finally, the thrift crisis of the late 1980s seemed to make banks more cautious in their lending as the consequences of lax lending standards became more apparent, especially since the banking industry had already been weakened by a series of earlier losses on LDC loans, energy credits, and agricultural loans. In this sense, the thrift industry may indirectly have contributed to the reduced willingness of banks to lend over the 1989-91 period by focusing attention on where the "next problem" might emerge among the financial intermediaries. All four of these adjustments were necessary, and by themselves they did not necessarily constitute a "credit crunch," but they did clearly contain elements of supply-side adjustments.[12]

At the same time, a substantial amount of adjustment took place on the demand side as well. The slower pace of economic activity and a more cautious attitude among borrowers combined to reduce the demand for credit. In addition, the abatement of inflationary pressures also seemed to prompt consumers and businesses to reassess the general wisdom of the heavy debt burdens accumulated during the 1980s, even as their ability to refinance this debt at lower rates seemed to alleviate the burden somewhat.

II. Evidence on the sources of the credit slowdown

In this section we survey the available empirical evidence on the nature and the extent of the 1989-91 credit slowdown. We begin with a brief review of the aggregate credit flows and then turn to specific markets and institutions.

A. Overview of aggregate credit trends

Table 1 shows the broad credit flows over the 1960-91 period, with the time since 1980 broken into three-year intervals to capture some of the shifting trends during the 1980s. From 1960 to 1979, total debt increased at about the same rate as GDP, while depository credit grew about 1.0 percentage point more rapidly than GDP. During the period 1980-82, these trends began to change. Total debt accelerated and began to grow more rapidly than GDP, while depository credit—primarily at thrift institutions—slowed sharply as home mortgage lending came to a virtual halt. But as the economic recovery progressed and consumers and corporations became more willing to take on debt, total debt as well as bank and thrift credit accelerated sharply. In the

Footnote 10 continued
and E. Gerald Corrigan, remarks at the Seventh International Conference of Bank Supervisors, Cannes, France, October 8, 1992. In several other countries, excessive debt burdens, financial innovation and integration, and speculation in real estate led to a sharp slowdown in debt growth relative to GDP and gave rise to financial strains.

[11]A more detailed discussion of the problems encountered by banks during the 1980s can be found in the testimony of John LaWare before the Senate Committee on Banking, Housing, and Urban Affairs, June 10, 1992. A convenient way to review the banking system's evolution during the 1980s is to read the annual review of trends in banking that appears in the *Federal Reserve Bulletin* under the title "Recent Developments Affecting the Profitability and Practices of Commercial Banks."

[12]Several studies using a cross sectional approach have shown a relationship between bank capital ratios and deposit or loan growth, suggesting that the difficulties banks encountered in the late 1980s affected their willingness to lend or their ability to fund loans. For more detail, see Ronald Johnson, "The Bank Credit Crumble," Federal Reserve Bank of New York *Quarterly Review*, Summer 1991, pp. 40-51; and Herbert Baer and John McElravey, "Capital Adequacy and the Growth of U.S. Banks," Federal Reserve Bank of Chicago, working paper, May 1992. Also see Ben Bernanke and Cara Lown, "The Credit Crunch," *Brookings Papers on Economic Activity*, 1992:2, pp. 205-39; and Joe Peek and Eric Rosengren, "The Capital Crunch in New England," Federal Reserve Bank of Boston *New England Economic Review*, May-June 1992, pp. 21-31.

1983-85 period, the growth of total debt exceeded GDP by 4 percentage points, depository credit growth exceeded GDP by 2 percentage points, and nondepository credit exceeded GDP growth by almost 6 percentage points. This acceleration in credit during the period 1983-85 was unprecedented. In recent years (1986-91), nondepository credit growth continued to exceed GDP growth by a wide margin (4.5 to 5.5 percentage points). Depository credit, on the other hand, decelerated sharply as thrift credit went into an outright decline in the 1989-91 period. Relative to the peak growth rates of the 1983-85 period, total debt decelerated 7.0 percentage points, nondepository credit about 4.5 percentage points, and depository credit 11 percentage points.[13] Bank lending, however, slowed considerably less, by about 6 percentage points. The slowing in GDP, at about 4.5 percentage points, was more moderate, suggesting that cyclical demand factors cannot explain all of the slowdown in credit between these time periods.

The trends in bank and thrift credit, as indicators of the supply of and demand for credit, have been dis-

[13]For alternative reviews of recent credit flows, see Fred Furlong, "Financial Constraints and Bank Credit," Federal Reserve Bank of San Francisco *Weekly Letter*, May 24, 1991; Steven Strongin, "Credit Flows and the Credit Crunch," *Chicago Fed Letter*, Federal Reserve Bank of Chicago, November 1991; and Robert Parry, "The Problem of Weak Credit Markets: A Monetary Policymaker's View," Federal Reserve Bank of San Francisco *Weekly Letter*, January 3, 1992.

Table 1

Credit Flows, 1960-91

Average Growth Rates

	Nominal GDP (1)	Total Debt (2)	Private Debt (3)	GDP less Total Debt [(1)-(2)] (4)	Depository Credit (5)	Bank Credit (6)	Bank Lending (7)	Thrift Credit (8)	Nondepository Credit (9)	GDP less Nondepository Credit [(1)-(9)] (10)
1960-79	8.6	8.3	9.4	0.3	9.6	9.3	10.5	10.1	7.2	1.4
1980-82	7.6	9.3	8.3	−1.7	6.3	7.6	6.6	3.9	12.5	−4.9
1983-85	9.1	13.1	12.2	−4.0	11.1	9.9	10.0	13.0	14.9	−5.9
1986-88	6.8	10.0	10.1	−3.1	8.1	7.4	8.9	9.3	11.5	−4.7
1989-91	4.5	6.2	5.2	−1.7	0.0	4.7	4.1	−9.1	10.4	−5.9

Sources: Board of Governors of the Federal Reserve System, Flow of Funds Accounts; U.S. Department of Commerce.

Table 2

Ratio of Debt to GDP

	Total	Growth	Business	Growth	Household	Growth	State and Local Government	Growth	Federal Government	Growth
1979	1.388	2.0	0.523	3.8	0.493	4.8	0.116	−3.9	0.255	−3.5
1980	1.389	0.1	0.524	0.1	0.496	0.6	0.110	−5.7	0.259	1.7
1981	1.395	0.4	0.533	1.7	0.491	−1.0	0.106	−3.7	0.265	2.1
1982	1.476	5.8	0.556	4.3	0.501	1.9	0.112	5.9	0.307	16.0
1983	1.486	0.7	0.549	−1.3	0.498	−0.6	0.110	−1.2	0.329	7.1
1984	1.560	5.0	0.581	6.0	0.515	3.5	0.110	0.0	0.353	7.2
1985	1.675	7.4	0.607	4.4	0.548	6.5	0.136	22.7	0.384	8.9
1986	1.803	7.6	0.647	6.7	0.596	8.6	0.143	5.5	0.416	8.4
1987	1.826	1.3	0.648	0.1	0.611	2.5	0.150	5.0	0.416	−0.0
1988	1.847	1.2	0.651	0.4	0.630	3.1	0.149	−0.7	0.417	0.2
1989	1.887	2.2	0.657	1.0	0.656	4.2	0.153	2.3	0.421	0.9
1990	1.935	2.5	0.651	−1.0	0.680	3.6	0.155	1.8	0.449	6.6
1991	1.947	0.6	0.625	−3.9	0.682	0.4	0.157	1.0	0.483	7.4
1992	1.938	−0.4	0.595	−4.9	0.681	−0.2	0.156	−0.4	0.506	5.0

Sources: Board of Governors of the Federal Reserve System, Flow of Funds Accounts; U.S. Department of Commerce.
Note: Ratios are calculated as of the fourth quarter of each year.

torted by several developments over the last decade. The decline in thrift credit probably does not have economic consequences commensurate with its size. With a large share of single family mortgages being securitized and sold in the capital markets, mortgage money has remained readily available to consumers at market rates (at different times with easier or tighter documentation) even as the thrift industry has downsized. In addition, in the case of failed thrifts, the remaining assets are either being funded and held by the Resolution Trust Corporation or have been sold to banks or other financial intermediaries and investors.

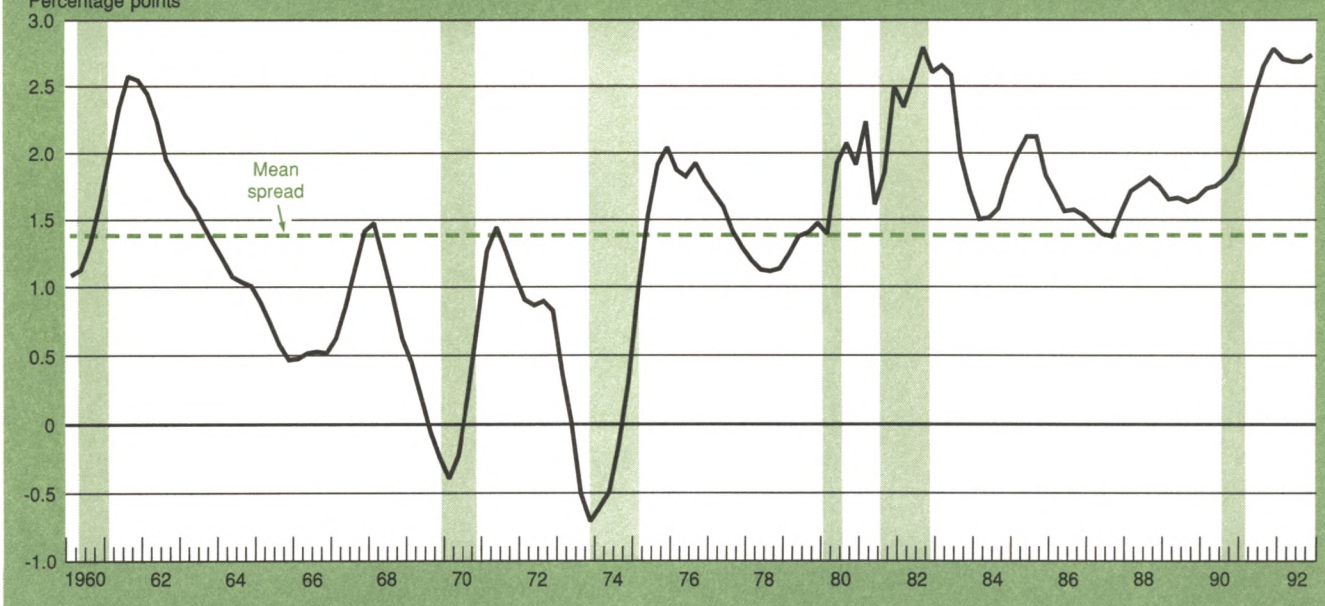
Similarly, banks have securitized a large fraction of their assets in recent years. As a result, bank credit did not accelerate nearly as much as total debt during the 1980s, and the slowdown in bank credit in the late 1980s probably understated the availability of bank-originated credit. Moreover, the continued rapid growth of nondepository credit relative to GDP suggests that much more credit is flowing outside the banking system (or is at least held outside the banking system) than in the past.

Table 2 shows the buildup in debt during the 1980s relative to GDP by class of borrower. In Table 2, as in Table 1, the increase in total debt outstanding was concentrated in the 1984-86 period. During this period, households, businesses, and government borrowed large sums relative to GDP. For the federal government, the rapid increase in debt began two years earlier, in 1982. After 1986, the increase in debt relative to GDP slowed dramatically. In the business sector, debt declined relative to GDP during the last three years. Household debt, relative to GDP, continued to grow at a fairly rapid rate until 1990, but slowed sharply in 1991. Because of the recession and the thrift bailout, the federal government had a rapid buildup in debt relative to GDP over the 1990-91 period. Compared with the ratios of debt to GDP that prevailed in 1979, total debt relative to GDP is now 40 percent greater, business debt 13 percent greater, household debt 39 percent greater, state and local government debt 35 percent greater, and the federal government's debt 98 percent greater. Clearly, the buildup in debt relative to GDP has occurred in all sectors of the U.S. economy, and neither the buildup during the 1980s nor the subsequent slowdown appears to be wholly attributable to changes in

Chart 3

Prime Rate less Federal Funds Rate

Four-Quarter Moving Average



Source: Board of Governors of the Federal Reserve System.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

the pace of economic activity.[14] That is, while cyclical demand factors have clearly figured importantly in the credit slowdown, there has been opportunity for shifts in the demand and supply of credit to play a role as well, particularly in the business sector. Next, we look more carefully at the evidence on the credit slowdown from the perspective of the bank and nonbank intermediaries and the bond and commercial paper markets.

B. The banking industry

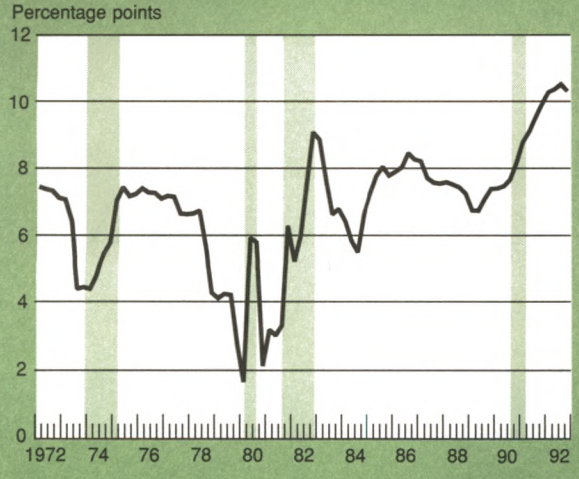
Over the past three years, analysts have pointed to several indicators of a credit crunch in the banking sector. Two of the most frequently cited indicators have been the wide spreads between bank lending rates and bank funding costs in both the corporate and consumer sectors (Charts 3 and 4). Both of these rate spreads are close to or above the record levels of earlier credit crunch periods, suggesting a reduced willingness on the part of banks to lend. In other words, if the weak credit growth was entirely demand driven, we would expect to see these rate spreads narrow as banks cut loan rates relative to funding costs to attract new business. Hence, these rate spread charts tend to provide some weak evidence that the lending slowdown at banks was supply driven at least in part.

Survey results also have been consistent with the notion that banks were less willing to lend during this period (Charts 5, 6, 7, 8, and 9). Both lenders and borrowers reported tighter credit standards, particularly in the 1990-91 period. These tighter credit standards applied to firms of all sizes and were imposed on commercial and industrial (C&I) loans, commercial real estate loans of all types, and land and development loans. In addition, the tighter standards were generally in line with those of earlier credit crunch periods. The surveys of the bankers, however, are not very helpful in determining the start of the reduced willingness to lend because they were discontinued from 1984 to 1989. Nonetheless, the net percentage of banks reporting tighter standards remained above zero well into 1991, suggesting that the "credit crunch" was not necessarily brief.

[14]The level of debt relative to GDP should not be overemphasized. Net worth, cash flow relative to interest expenses, and other factors are also important in determining the burden of debt. A review of these issues can be found in Ben Bernanke and John Campbell, "Is There a Corporate Debt Crisis?" *Brookings Papers on Economic Activity*, 1988:1, pp. 83-140. For an earlier review of the relationships among debt burdens, cash flows, and net worth in determining how financial factors can destabilize the economy, see Hyman Minsky, "Financial Crisis, Financial Systems, and the Performance of the U.S. Economy," *Private Capital Markets*, Commission on Money and Credit, 1964.

Chart 4

Spread between Personal Loan Rate and the Six-Month Certificate of Deposit Rate

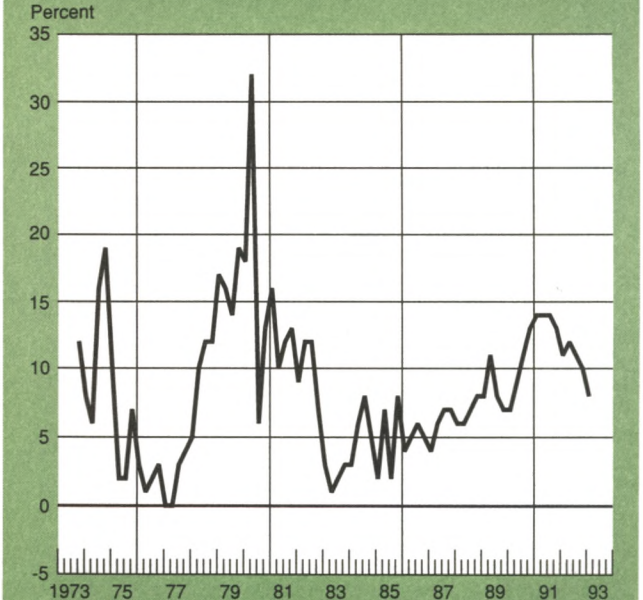


Source: Board of Governors of the Federal Reserve System.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

Chart 5

Borrower Surveys of Credit Availability: Net Percent Reporting "Loans Harder to Get" than in Previous Quarter



Source: National Federation of Independent Businesses.

Some of the reasons that banks became more reluctant to lend were the increases in their charge-off rates and delinquency rates on all types of bank loans, including consumer loans, C&I loans, and real estate lending (Chart 10). These problem loans tended to weaken bank capital positions, and as Chart 11 indicates, lending tended to slow or decline more over time at those banks with lower capital positions.[15] Again, this evidence is consistent with supply side factors' playing at least some role in bank credit slowdown.[16]

[15]Note, however, that this chart should be interpreted with caution if the object is to analyze how serious the crunch might have been at capital-constrained banks. First, some borrowers did have the ability to switch from weak banks to strong banks during this period, thereby inflating the strong-bank numbers and reducing the weak-bank numbers with no real change in aggregate lending. Second, the relatively better performance of the strong banks stems "in part" or "to some extent" from the acquisition of weaker banks, again leading to an overstatement of the impact of their relative performance on aggregate credit availability. Finally, the distribution of bank assets across capital classifications is not uniform. Well-capitalized banks have just under 65 percent of all assets, adequately capitalized slightly more than 33 percent, and undercapitalized banks just under 2 percent.

[16]There is also some evidence that banks tightened lending terms during the credit crunch period. In 1985, 25 percent of short-term loans required collateral; in 1989, 41 percent. For long-term lending, 47 percent were collateralized in 1985 and 65 percent in 1989.

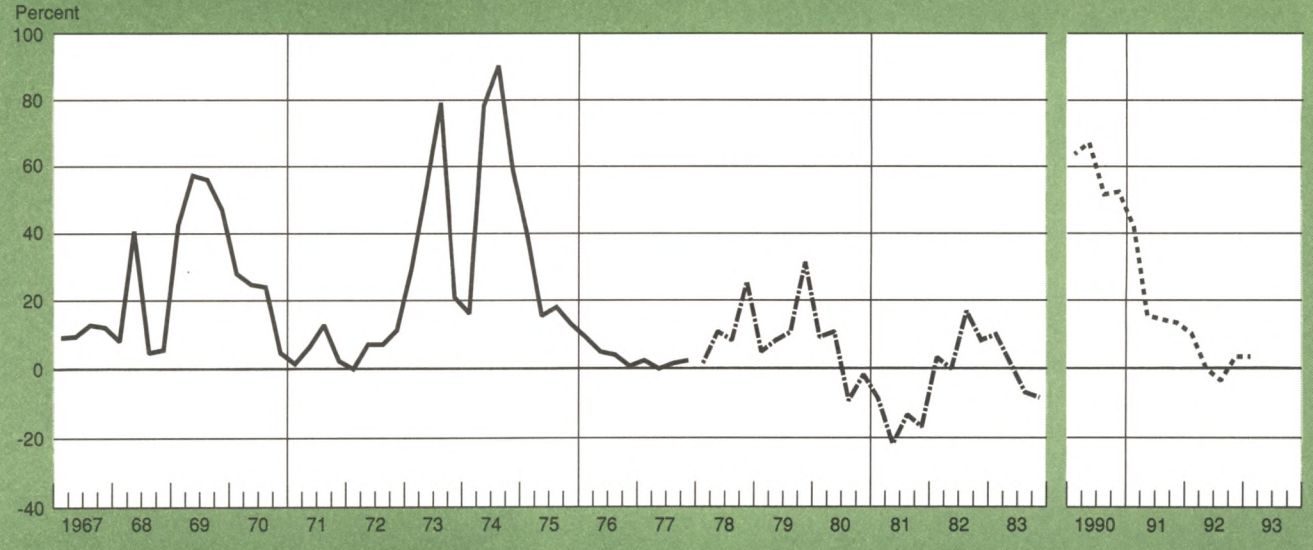
Finally, Chart 12 highlights another possible indicator of the increased reluctance of banks to lend during this period. Banks sharply increased their holdings of securities as a share of C&I loans plus securities. This increase, however, appears to be a fairly typical cyclical response, and whether it is ultimately indicative of a reduced willingness to lend from the supply side or a lack of demand for bank loans will depend on how long this trend persists in this most recent business cycle.[17]

In sum, there appear to be several indications that the slowdown in lending at banks was not just demand driven; factors from the supply side seem to have contributed as well. In all cases, however, the interpretation of the supply indicators is ambiguous to some degree, making it difficult to assess how much supply-side con-

[17]In Board of Governors of the Federal Reserve System, "Senior Loan Officer Opinion Survey on Bank Lending Practices," August 1992, bank loan officers were asked why their bank had increased its securities holdings over the last 2½ years. Of the fifty-nine respondents, thirty-five emphasized that securities offered greater profits, thirteen cited the uncertain economic outlook, eleven said they were seeking to fund anticipated increases in loan demand, nine said they wished to improve their risk-based capital ratios, and nine gave other reasons. (Banks were allowed more than one answer.)

Chart 6

Lender Surveys of Credit Availability: Net Percent Reporting Firmer Standards than in Previous Quarter

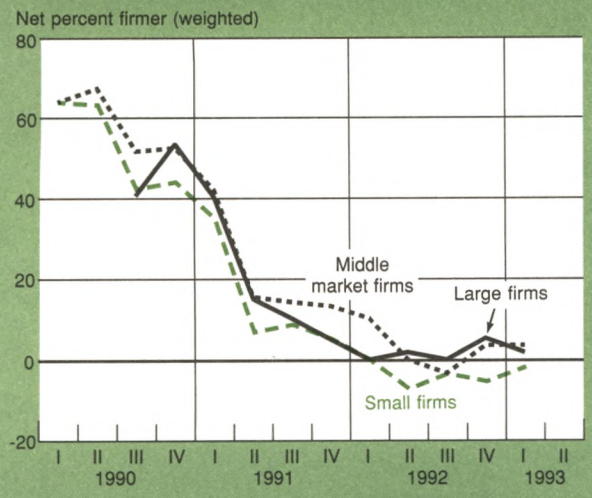


Notes: The Senior Loan Officer Survey questionnaire focused on different measures of creditworthiness over the years: in 1967-77, credit standards for loans to nonfinancial businesses; in 1978-83, standards to qualify for the prime rate; in 1990-92, credit standards for loans to nonfinancial businesses by size of firm. The values for 1990-92 in the chart reflect credit standards for approving loans to middle market firms.

The Survey results are transformed into an index, "net percent firmer," by weighting individual response as follows: considerably firmer (200%), moderately firmer (100%), unchanged (0%), moderately easier (-100%), and considerably easier (-200%).

Chart 7

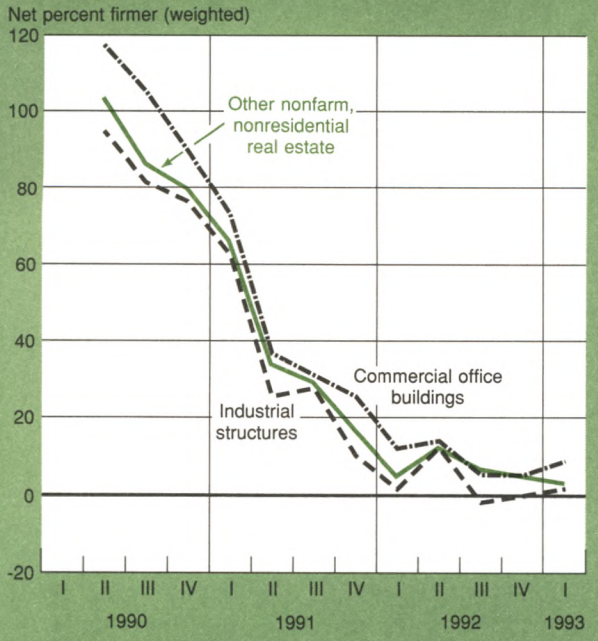
Standards of Creditworthiness for Commercial and Industrial Loans



Source: Board of Governors of the Federal Reserve System, Senior Loan Officer Opinion Survey.

Chart 8

Credit Standards for Real Estate Loans



Source: Board of Governors of the Federal Reserve System, Senior Loan Officer Opinion Survey.

siderations may have added to the overall slowdown in credit.

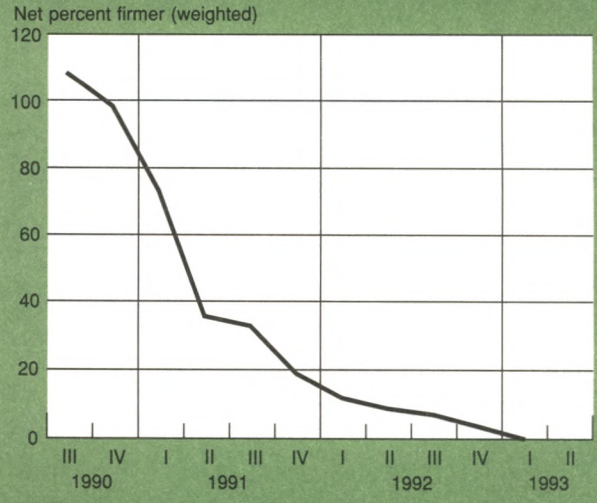
C. Nonbank intermediaries

Finance companies and insurance companies also faced difficulties during the 1989-91 period that may have curtailed their ability to extend credit. As a result, credit supply problems may have been created for certain types of borrowers dependent on these intermediaries for credit. Many finance companies were downgraded by the credit rating agencies either because the financial condition of their parent companies had deteriorated or because they themselves had suffered major losses in their commercial lending businesses. These credit rating downgrades may have had a significant effect on lending because most finance companies raise the majority of their funds in short-term public credit markets. (Chart 13 shows the large increase in loan loss reserves at finance companies, while Chart 14 contains a summary of the credit rating downgrades.) As a result of these difficulties as well as the general reduction in the demand for credit, finance company lending slowed considerably after 1989 after growing quite rapidly through much of the 1980s.

Similarly, in the life insurance industry, many firms experienced credit rating downgrades and intense scrutiny in the press and in Congress because of weak

Chart 9

Credit Standards for Land and Development Loans



Source: Board of Governors of the Federal Reserve System, Senior Loan Officer Opinion Survey.

earnings, poor asset quality, and the appearance of inadequate supervision and insufficient capital. Most of the industry's problems can be traced to problem commercial real estate loans (Chart 15), poorly performing junk bond portfolios, and the generous rates of return promised to investors in guaranteed investment contracts in the mid-1980s. As a result of these problems and the failures of some insurance companies, the National Association of Insurance Commissioners (NAIC) adopted rules in mid-1990 that required greater disclosure of and reserves against below-investment-grade bonds. These developments not only reduced the willingness of insurance companies to invest in below-investment-grade bonds (Table 3),[18] but also contributed to a shift toward less risky private placement commitments more generally (Chart 16).[19] On the whole, for both insurance and finance companies, the evidence appears consistent with the notion that supply-side factors contributed to the slowdown in their lending, perhaps with stronger impacts on borrowers with weak credit ratings.

[18]Table 3 reports the declining share of bonds rated "B or below" in insurance company investment portfolios. The new NAIC rules reportedly had their greatest impact on the willingness of insurers to invest in BB-rated bonds, but time series data on this class of investments are not readily available.

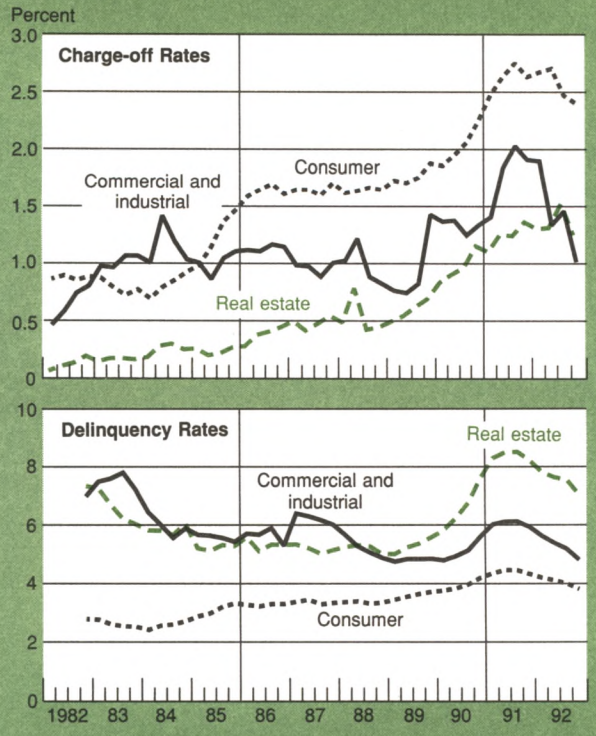
D. Bond and commercial paper markets

In the investment-grade corporate bond market, only very limited evidence of reduced credit availability can be found despite a huge surge in defaults (Chart 17) and a much wider spread between the number of downgraded corporations and the number of upgrades during this period (Chart 18). There was only a slight tendency for a wider spread to develop between corporate bond

[19]This subject is discussed further in Mark Carey, Stephen Prowse, John Rea, and Gregory Udell, "The Private Placement Market: Intermediation, Life Insurance Companies, and a Credit Crunch," and Patrick Corcoran, "The Credit Slowdown of 1989-1991: The Role of Demand," in *Credit Markets in Transition*, Federal Reserve Bank of Chicago, 1992. Both papers report that spreads between public and private placements for bonds rated BB or below widened to unprecedented levels during the credit crunch period.

Chart 10

Charge-off and Delinquency Rates on Loans by Medium and Large Insured Commercial Banks, by Type of Loan

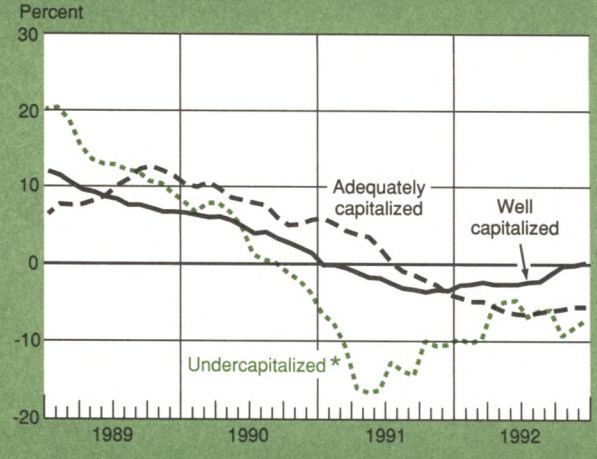


Source: Board of Governors of the Federal Reserve System, Senior Loan Officer Opinion Survey.

Chart 11

Loans at Weekly Reporting Banks Selected by Capital Status

Growth from Twelve Months Earlier



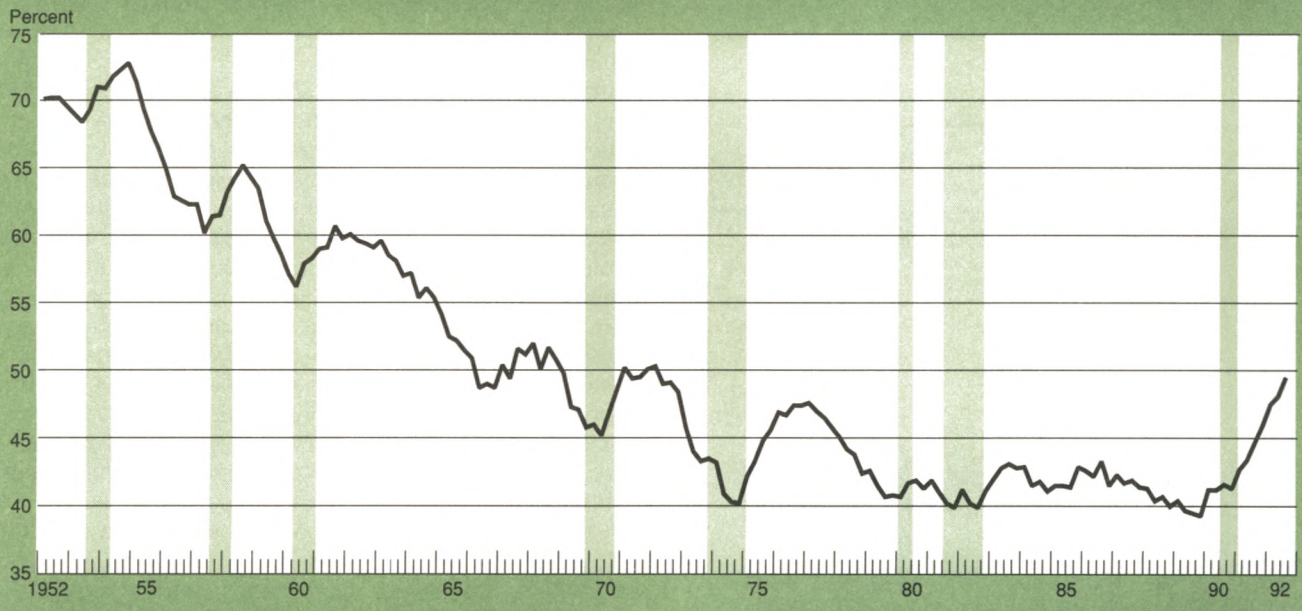
Source: Board of Governors of the Federal Reserve System.

Note: Capital status determinations, based on the Federal Deposit Insurance Corporation *Call Report*, are as of September 30, 1992.

*Includes undercapitalized, significantly undercapitalized, and critically undercapitalized banks.

Chart 12

Security Holdings of Banks as a Percentage of Security Holdings of Banks plus Commercial and Industrial Loans



Source: Board of Governors of the Federal Reserve System, Flow of Funds data.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

rates and the Treasury bond rate (Chart 19). Likewise, only a slightly wider spread became apparent between the Baa-rated issues and the Aaa-rated issues (Chart 20). These results suggest that investment-grade borrowers were not severely squeezed during this period.

The junk bond market was more severely affected than the investment-grade market. New issuance of publicly traded junk bonds virtually ceased by 1990 (Chart 21), and the yield spreads between junk bonds and investment-grade bonds soared in 1989 and 1990 (Chart 22), suggesting a "credit crunch" of sorts in the junk bond market. Likewise, privately placed below-investment-grade bonds were hard hit during this period. As noted earlier, insurance companies reduced their willingness to invest not only in publicly traded junk bonds, but also in below-investment-grade private placements, a traditional life insurance investment in middle market firms without public credit ratings. As a result, private placements declined sharply as a percentage of total bonds issued (Chart 23), although in part this development appears to be normal during recessions.

Chart 13

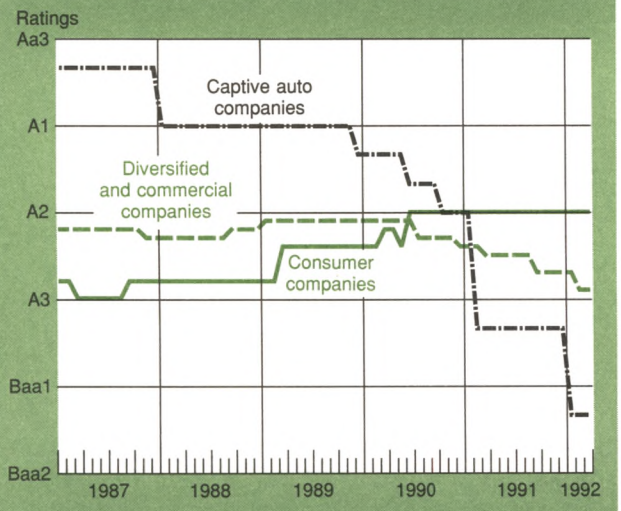
Loan Loss Reserves at Finance Companies

Percent of Net Receivables

Source: Board of Governors of the Federal Reserve System.

Chart 14

Senior Debt Ratings of Finance Companies

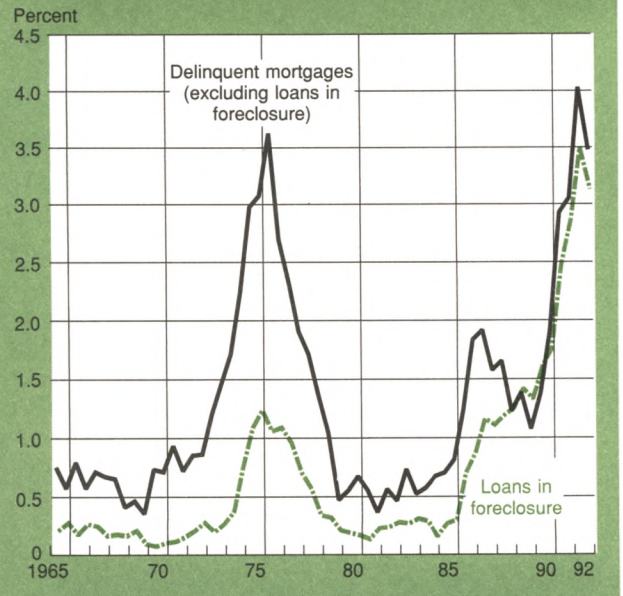


Source: Moody's Investor Service.

Note: Sample consists of five consumer companies, three captive auto companies, and ten diversified and commercial companies.

Chart 15

Problem Commercial Mortgages at Life Insurance Companies



Source: American Council of Life Insurance.

The commercial paper market also showed some signs of a "credit crunch" for borrowers without strong credit ratings. Before 1989, only two defaults had occurred in the history of the U.S. commercial paper market, Penn Central in 1970 and Manville in 1982. In 1989, six issuers defaulted with $731 million in paper outstanding; and in 1990, six more defaulted with $391 million in paper outstanding. Under these circumstances, the parents of commercial paper mutual funds purchased the defaulted paper at a loss to preserve the asset value of the money market mutual fund. The industry became concerned, however, that at some point a parent might not support a fund that had overinvested in risky commercial paper, possibly creating a run on the entire industry as investors attempted to exit before losses were realized. In July of 1990, the Securities and Exchange Commission adopted rules that imposed strict limits on the amount of "second tier" paper that mutual funds could hold. At least in part as a result, the share of second-tier commercial paper outstanding declined from about 15.1 percent in June 1990 to around 5.4 percent two years later.[20] Since commercial paper is backed by bank lines, these firms probably had access to bank credit and may thereby have squeezed out other firms at capital-constrained banks.

The spread between top-rated commercial paper and Treasury bill rates suggests that highly rated borrowers in 1990-91 had easier access to credit than in past

[20]This subject is discussed further in Leland Crabbe and Mitchell Post, "The Effect of SEC Amendments to Rule 2A-7 on the Commercial Paper Market," Working Paper no. 199, Board of Governors of the Federal Reserve System, May 1992.

Table 3

Bond Holdings Rated "B" or Below of Twenty Large U.S. Insurance Companies

Thousands of Dollars

Year	Total Bond Holdings (A)	Holdings Rated "B" or Below (B)	(B)/(A)
1987	$211,637	$17,545	8.3%
1988	255,089	17,810	7.0
1989	281,881	19,604	7.0
1990	303,548	17,504	5.8
1991	334,965	16,502	4.9

Sources: Conning and Company; Federal Reserve Bank of New York estimates.

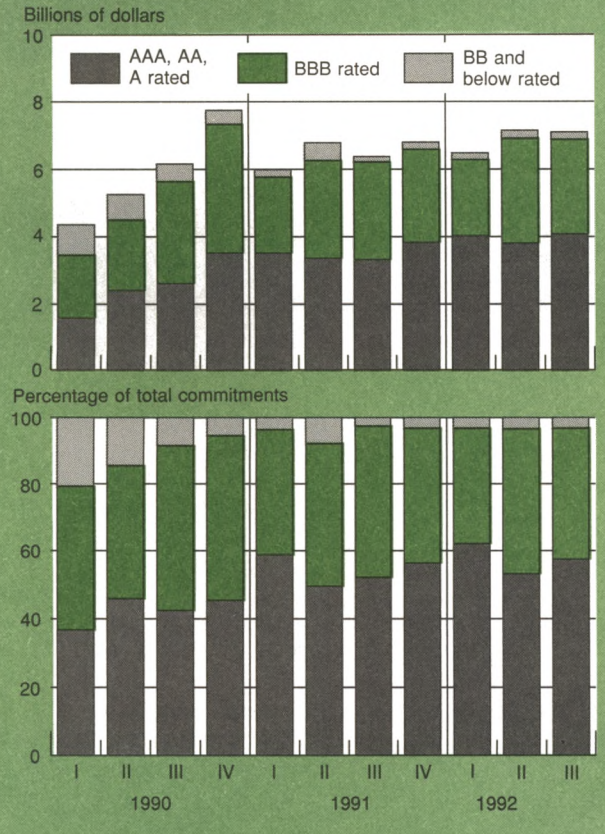
Notes: Sample consists of the twenty life insurance companies with the highest corporate bond holdings. It does not include companies with large holdings of low-rated bonds but relatively small total bond holdings, such as First Capital and Executive Life. TIAA-CREF is excluded because data are unavailable.

recessions (Chart 24). However, the spread between the rate on A-2/P-2 paper and the rate on A-1/P-1 paper was unusually wide in 1990 and 1991, with dramatic spikes at year-end as investors avoided lower grade paper and made last-minute adjustments to avoid reporting risky assets on their public accounting statements. The longer term market, as noted earlier, was not as dramatically affected (Chart 25).

As in the case of the financial intermediaries, much of the evidence from the commercial paper market and the bond market appears consistent with the notion that supply-side factors contributed to the credit slowdown as investors shifted toward less risky assets. Although demand-side forces were probably important, the evidence in this section suggests that supply-side considerations resulting from weakened financial intermediaries and more conservative investment strategies played a strong role in the credit slowdown.

Chart 16

Private Placement Fixed-Rate Bond Commitments by Life Insurers



Source: American Council of Life Insurance.

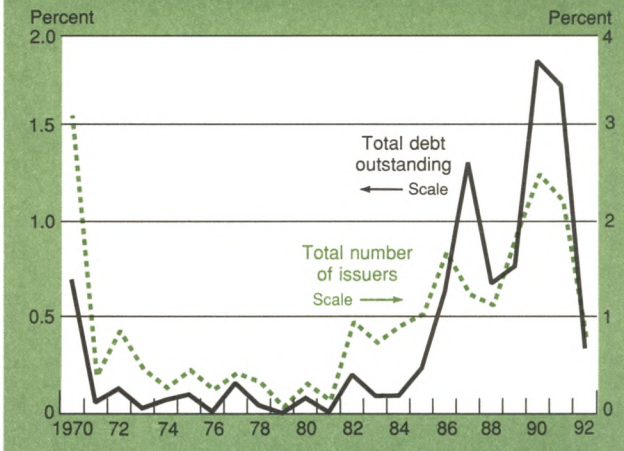
III. Other factors behind the credit slowdown

The credit slowdown that followed these events has been a protracted one, in part because the economy went through a period of slow growth and recession that lasted over three years. Consumers and businesses that had amassed heavy debt burdens in the 1980s were in no position to promote a rapid recovery by increasing spending, even if credit were readily available. Moreover, fiscal policy, encumbered by large deficits, could only play a very limited role in turning the economy around. Monetary policy, in contrast, eased throughout this period, reducing short-term rates substantially. Borrowers with direct access to the financial markets (those with investment-grade ratings) clearly benefited from this policy change, but those borrowers who relied on intermediated credit may not have benefited as much as they might otherwise have done if our financial intermediaries had been in strong financial condition. Banks, coping with their own problems, maintained very wide net interest rate margins even as monetary policy eased. Hence the difficulties experienced by the financial intermediaries in recent years may have reduced the effectiveness of monetary policy by blocking the "credit channel."[21]

[21]For more detail, see Donald Morgan, "Are Bank Loans a Force in Monetary Policy?" Federal Reserve Bank of Kansas City *Economic Review*, Q2-1992, pp. 31-41. An earlier, more theoretical exposition can be found in Ben Bernanke and Alan Blinder, "Credit, Money and Aggregate Demand," *American Economic Review*, May 1988, pp. 435-39. An account of the credit channel written for a more general audience can be found in Ben Bernanke, "Monetary Policy

Chart 17

Corporate Bond Defaults

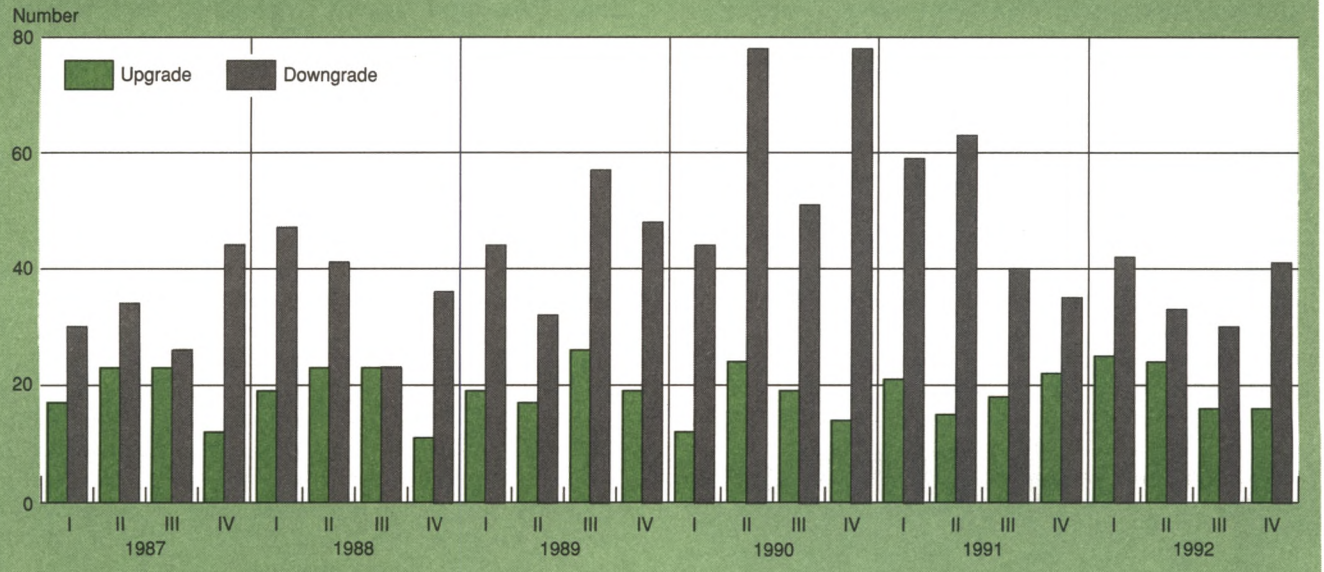


Sources: Morgan Stanley; Moody's Investor Service; Standard & Poor's Corporation.

Chart 18

Credit Rating Changes for U.S. Corporate Bonds

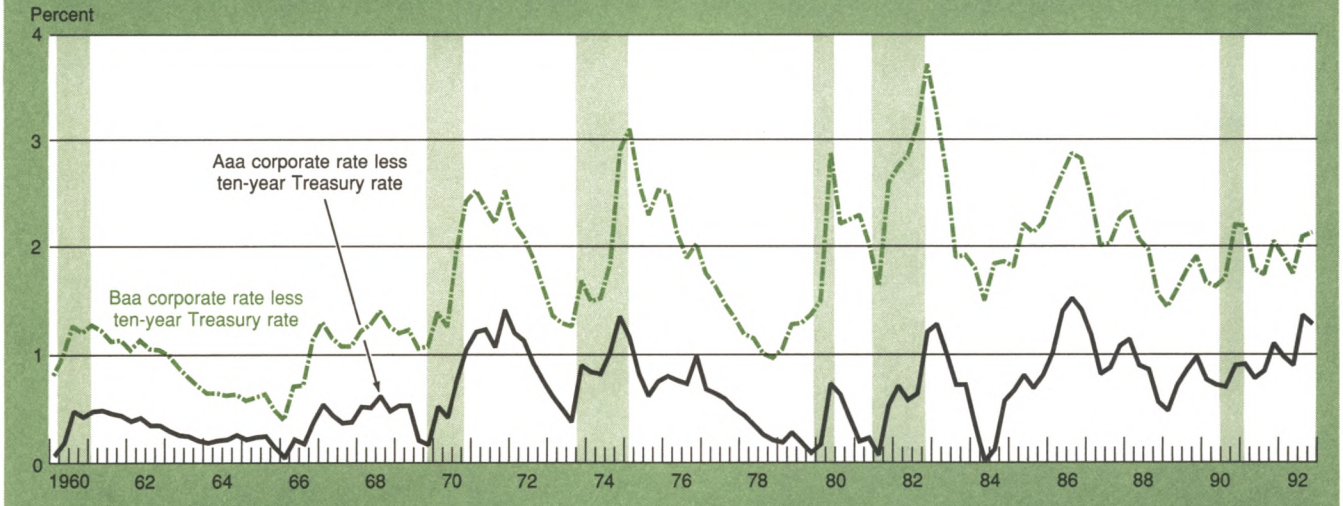
Industrial Corporations



Source: Moody's Investor Service.

Chart 19

Investment Grade Corporate Bond Rates less Ten-Year Treasury Rate



Sources: Moody's Investor Service; Federal Reserve Bank of New York Market Reports.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

In sum, although there has been considerable time to analyze and debate the nature and causes of the "credit crunch," and although most analysts might agree in a broad sense with the outline presented above, a true consensus has not emerged even at this late date as to how much weight should be assigned to the various forces involved. Because a slowdown in economic activity lowered credit demand at the same time that (1) consumers and business worked to reduce heavy debt burdens, (2) financial intermediaries reevaluated their secured and unsecured lending standards in light of the fall in real estate values and the recession, and (3) the asset quality and capital adequacy of financial institutions came under increased scrutiny by private investors and regulators, it has been difficult to sort out the demand and supply causes of the recent credit slowdown.

While we can find evidence that supply-side factors contributed to the credit slowdown, the presence of some demand-side factors as well makes it difficult to estimate precisely how much of the slowdown should be attributed to supply-side considerations. The situation is made more complex because other factors, not associated with the excesses of the 1980s, may also have played a role. In the remainder of this section, we will briefly review two of these special factors that could have contributed to the slowdown in credit in the late 1980s: improved inventory management and the actions of the regulators.

A. Inventory management

Some analysts have noted that improved inventory management since the early 1980s, particularly in the manufacturing sector, may have reduced the demand for short-term financing in the most recent cycle.[22] As a result, cyclical comparisons of C&I loans for evidence of a credit crunch may be biased because this change in inventory management may have created an exogenous decline in the demand for C&I lending.

Chart 26 shows a downward trend in the ratio of inventory to sales beginning in the early 1980s. The shift is most dramatic for the manufacturing sector, where anecdotal evidence suggests increased use of

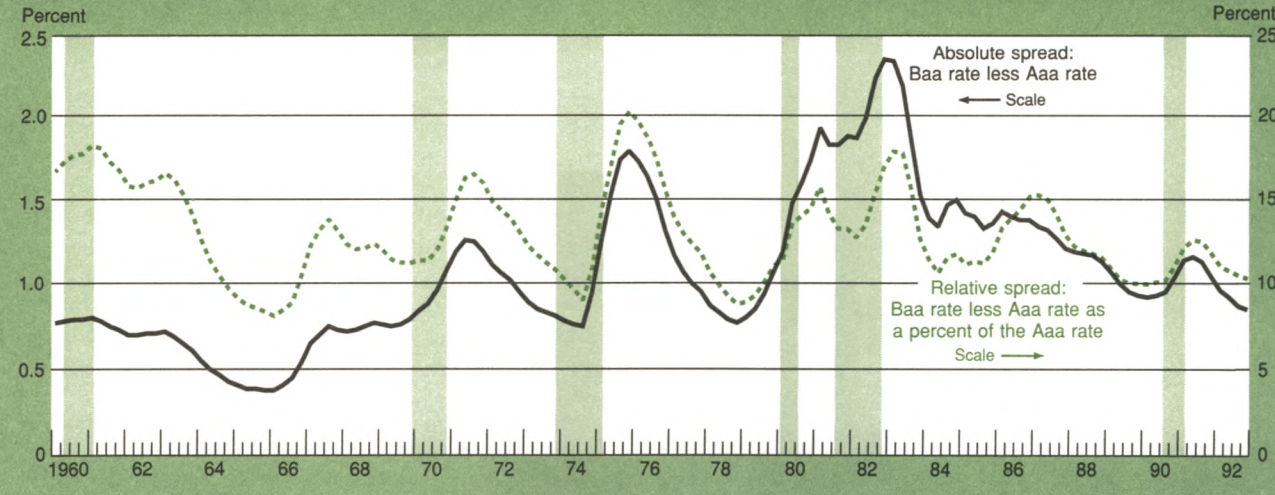
Footnote 21 continued
Transmission Mechanism: Through Money or Credit?" Federal Reserve Bank of Philadelphia *Business Review*, November-December 1988, pp. 3-11.

[22]An analysis of the role of inventories in the recent credit slowdown can be found in Kevin Kliesen and John Tatom, "The Recent Credit Crunch: The Neglected Dimension," Federal Reserve Bank of St. Louis *Review*, September-October 1992, pp. 18-36. For documentation of improved inventory management, see Dan Bechter and Stephen Stanley, "Evidence of Improved Inventory Control," Federal Reserve Bank of Richmond *Economic Review*, January-February 1992, pp. 3-12.

Chart 20

Investment Grade Corporate Bond Spreads

Four-Quarter Moving Average



Source: Moody's Investor Service; Federal Reserve Bank of New York Market Reports.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

"just-in-time" inventory management. Chart 27 indicates that a loose relationship has existed between the growth in nominal inventories and bank C&I loans over time, including the period since 1989 during which both series have slowed dramatically.

In Chart 28, we compare the ratio of business inventories to sales for the most recent cycle with the corresponding ratio for an average of four earlier cycles.[23] Over the most recent cycle, this ratio has ended up roughly 7 percentage points below the normal pattern; the level of nominal inventories is roughly $75 billion less than would be expected on the basis of past cycles.

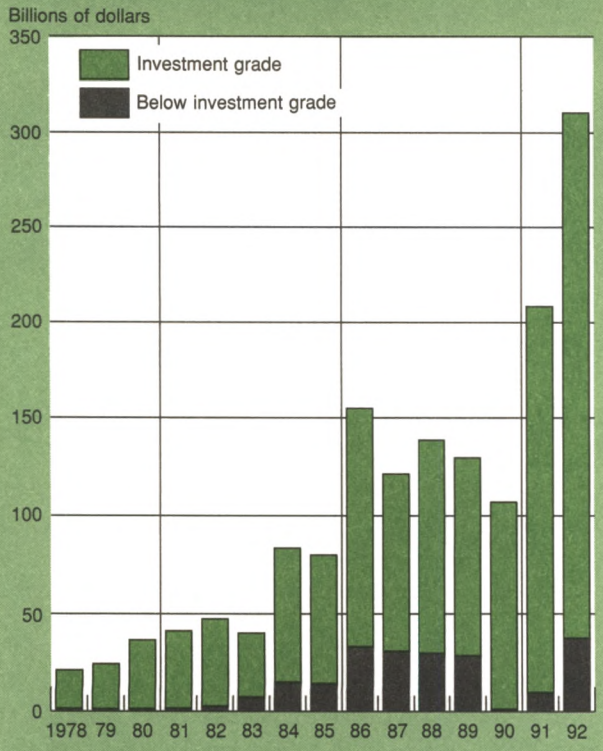
It is more difficult to judge how weak business loans are relative to a "normal cyclical pattern." Chart 29 compares C&I loans in the most recent cycle with the average of past cycles. It suggests that C&I lending is roughly 37 percentage points weaker, a shortfall that amounts to about $288 billion. Given that $75 billion (the unusual weakness in inventories) is about 25 percent of $288 billion, it appears that better inventory management did have some impact on C&I lending, although this improvement explains only a relatively small fraction of the overall weakness.

Alternatively, in Chart 30 we compare the ratio of C&I lending to business sales in the most recent cycle and in earlier cycles. Relative to the level of business activity, lending appears to be about 24 percentage points, or $187 billion, weaker in the most recent cycle. This cyclical comparison suggests that the $75 billion shortfall in inventories would amount to about 39 percent of the unusual weakness in C&I lending. These orders of magnitude, 25 to 39 percent, are intended to be only rough estimates of the possible role of inventories from the demand side and could overstate the impact of the demand side to the extent that banks systematically cut back on business lending during the crunch period, including lending to finance inventories. In addition, not all inventories are financed at banks: some are financed in the commercial paper market or at finance companies.[24] In any case, while improved inventory management may be part of the story behind the slowdown in bank lending, its contribution is relatively small.

[23]By indexing each cycle relative to the peak quarter, we can largely eliminate the longer run downward trend in inventories and focus more directly on how businesses have managed inventories in this most recent cycle relative to earlier cycles and hence may have made business loans appear unusually weak in this most recent cycle.

Chart 21

Nonconvertible Public Domestic Debt Issuance



Sources: Morgan Stanley; *Investment Dealers' Digest*; Securities Data Corporation.

B. The regulators

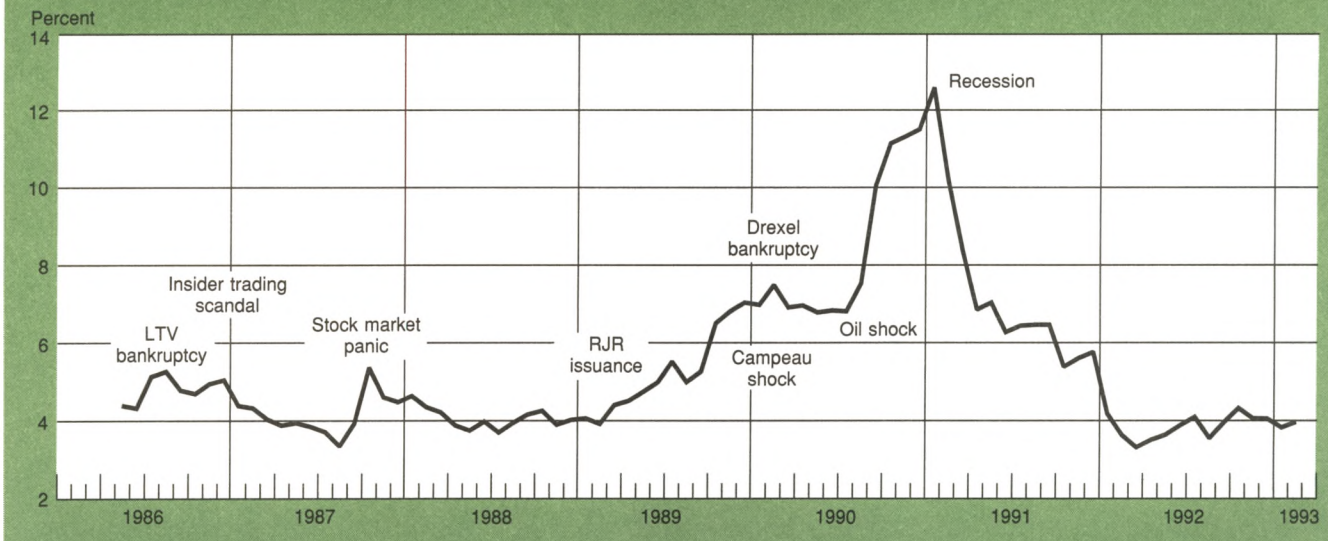
Because several factors from both the demand side and the supply side have apparently contributed to the slowdown in credit, the role of regulators in this credit slowdown is difficult to determine empirically, although the regulators certainly have received more attention in the press. To the extent that the regulators forced banks to face up to the reality of the real estate market and the state of the economy, they were merely messengers bearing bad news. That is, since the effects of some other factors contributing to the credit slowdown were transmitted through the regulatory process, the exogenous role of the regulators may have seemed larger than it actually was. Nevertheless, to the extent that regulators became more aggressive in pressing banks to raise credit standards, they could have been an independent factor behind the slowdown in bank lending.

Governor LaWare, in a recent statement before Congress, provided a summary of the regulatory process

[24]If we repeat the above exercise but include business lending at finance companies and nonfinancial commercial paper along with C&I lending at banks, inventories can account for 15 to 29 percent of the cyclically unusual weakness in total short-term business credit.

Chart 22

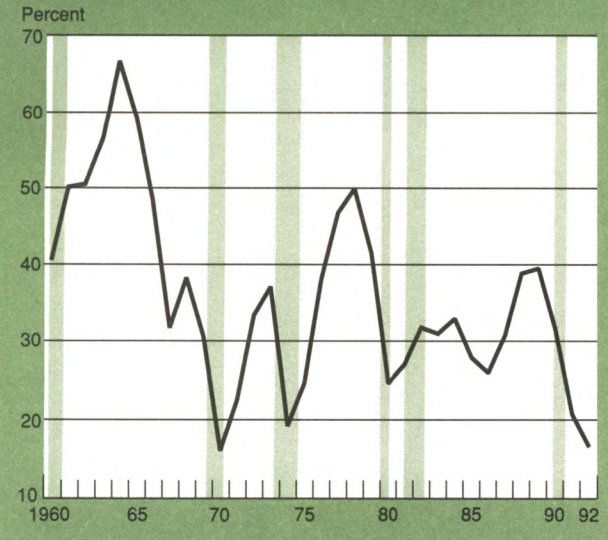
High-Yield Corporate Bond Rate less Ten-Year Treasury Rate



Source: Morgan Stanley.

Chart 23

Share of Total Private Placements in Corporate Bond Issuance



Source: *Federal Reserve Bulletin.*

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

during this period. He noted that with the benefit of hindsight, we can see that regulators should probably have acted much earlier and more vigorously in the boom phase to avert the banking industry's problems, but that it is difficult to impose such standards in good times. Governor LaWare also addressed the question of allegedly excessive tightening of credit standards and the regulatory agencies' responses:[25]

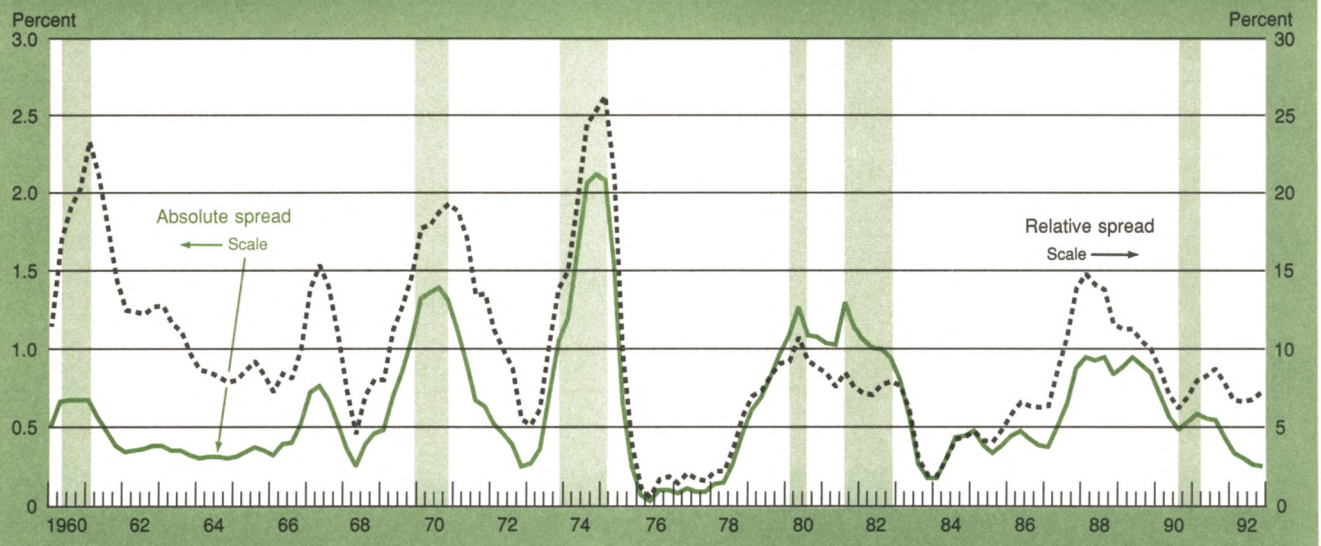
> Concerns about excessive tightening of credit standards by many banks and the inability of apparently creditworthy borrowers to obtain or renew bank financing in the wake of examiner criticisms of commercial real estate credits led the agencies to undertake an extensive review of their examination practices throughout much of last year. In recognition that banks had shifted markedly in their willingness to lend, the agencies undertook special efforts to coordinate and clarify their supervisory policies.
>
> Much of the reduced willingness to lend was understandable given weak economic conditions, the level of excess capacity in commercial real estate

[25]John LaWare, testimony before the House Committee on Banking, Finance, and Urban Affairs, July 30, 1992.

Chart 24

Six-Month Commercial Paper Rate less Six-Month Treasury Bill Rate

Four-Quarter Moving Average

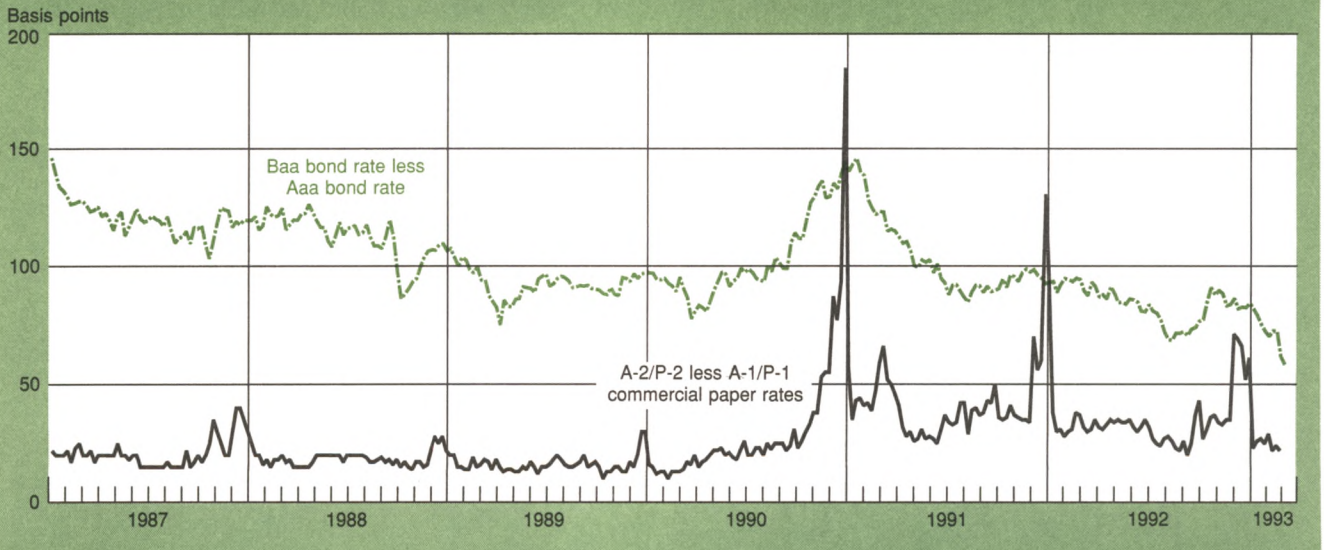


Source: Federal Reserve Bank of New York Market Reports.

Notes: Relative spread is the commercial paper rate less the Treasury bill rate as a percentage of the Treasury bill rate. Absolute spread is the commercial paper rate less the Treasury bill rate. Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

Chart 25

Quality Spreads in the Commercial Paper and Corporate Bond Markets



Sources: Moody's Investor Service; Federal Reserve Bank of New York Market Reports.

markets, and the asset quality problems of many banks. Moreover, some strengthening of credit standards was needed in much of the industry, and those changes would necessarily affect the lending policies of many banks. Nevertheless, the agencies felt that banks might be tightening unduly because of concerns about supervisory actions. We wanted to ensure that banks did not misunderstand our supervisory policies or believe that examiners would automatically criticize all new loans to troubled industries or borrowers.

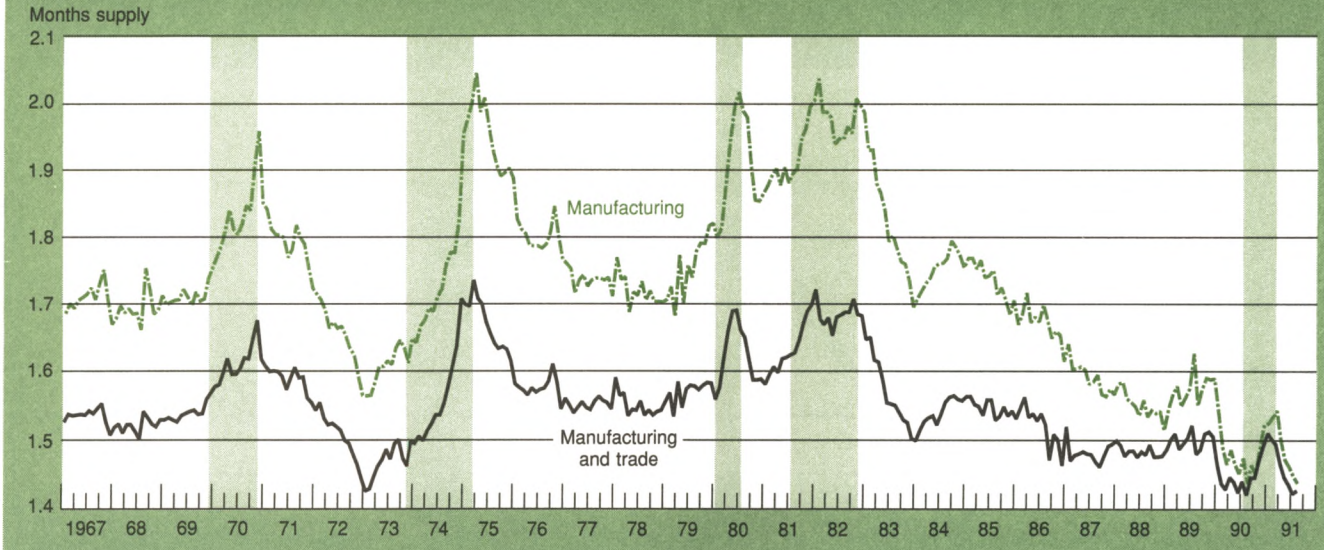
Accordingly, building on earlier initiatives, in March 1991, the agencies issued a joint statement to address this matter. That statement sought to encourage banks to lend to sound borrowers and to work constructively with borrowers experiencing temporary financial difficulties, provided they did so in a manner consistent with safe and sound banking practices. The statement also indicated that failing to loan to sound borrowers can frustrate bank efforts to improve the quality and diversity of their loan portfolios. Under-capitalized institutions and those with real estate or other asset concentrations were expected to submit plans to improve their positions, but they could continue sound lending activities provided the lending was consistent with programs that addressed their underlying problems.

At other times during the year, and particularly in early November, the agencies expanded on that March statement and issued further guidance regarding the review and classification of commercial real estate loans. The intent was to ensure that examiners reviewed loans in a consistent, prudent, and balanced fashion. This second statement emphasized that evaluation of real estate loans should be based not only on the liquidation value of collateral, but also on a review of the borrower's willingness and ability to repay and on the income-producing capacity of the properties.

Finally, in December, in order to assure that these policies were properly understood by examiners and to promote uniformity, the agencies held a joint meeting in Baltimore of senior examiners from throughout the country in one more effort to achieve the objectives just described. Once again, the principal message was to convey the impor-

Chart 26

Ratio of Real Inventories to Real Sales



Source: U.S. Department of Commerce.

Notes: Values are based on data available as of December 1, 1992. Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

tance of balance. Examiners were not to overlook problems, but neither were they to assume that weak or illiquid markets would remain that way indefinitely when they evaluated commercial real estate credits.

Because the regulators were part of the process through which the banks became aware of the changing economic situation, precisely defining their role is difficult. Indeed, other regulators have suggested more strongly than Governor LaWare that the shortcomings of the regulatory process were not in managing the retrenchment over the 1989-91 period, but rather in failing to contain the excesses created in the preceding three or four years.[26] They argue that the regulators should have been more aggressive in increasing capital earlier in the 1980s when the risky lending was actually taking place; this larger capital cushion could have been used to absorb loan losses during the downturn, preventing banks from having to cut off credit to other borrowers.

By imposing higher leverage capital ratios after the losses became apparent, the regulators, according to Syron and Randall, may have forced banks to downsize, thereby reducing credit supply to borrowers dependent on intermediated credit. Thus, some banks that were able to meet the risk-based asset requirements found that their condition deteriorated. They were constrained by the higher leverage ratio of tier one capital to unweighted assets imposed by regulators. Clearly, investments could not be reallocated to meet this constraint, and the only option available to banks in this position was to downsize (if unable to raise more tier one capital). Chairman Greenspan and Richard Syron have argued that the leverage ratio should be eliminated as soon as the risk-based measures have been revised to capture the full spectrum of risks faced by bankers.[27]

[26]Richard Syron, "Are We Experiencing a Credit Crunch?" Federal Reserve Bank of Boston *New England Economic Review*, July-August 1991, pp. 3-10; and Richard Syron and Richard Randall, "The Procyclical Application of Bank Capital Requirements," Federal Reserve Bank of Boston, *Annual Report, 1991*.

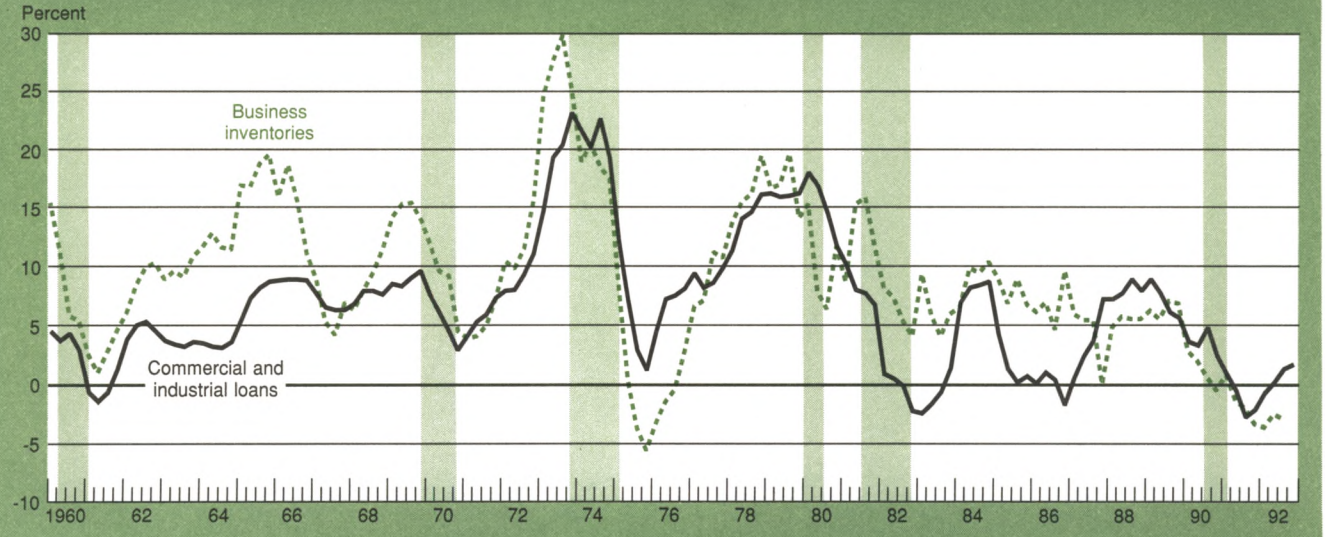
[27]For example, see the transcript of Chairman Greenspan's statement to the House Subcommittee on Domestic Monetary Policy, *Federal Reserve Report to Congress on Monetary Policy*, July 22, 1991, pp. 35-36. Also see statements by John LaFalce, William Taylor, Jerome Powell, and Timothy Ryan, *The Impact of Bank Capital Standards on Credit Availability*, House Committee on Small Business, July 9, 1992.

For additional views of the regulators on the credit crunch, see statements by Alan Greenspan, Paul Fretts, Robert Clark, and

Chart 27

Business Inventories and Commercial and Industrial Loans

Growth from Four Quarters Earlier



Source: U.S. Department of Commerce.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

In any case, by the late 1980s and early 1990s, steps were being taken to promote an alternative regulatory approach for banks after the costly savings and loan bailout. Higher capital requirements and insurance premiums were imposed, restrictions on access to the discount window were established for troubled institutions, and prompt regulatory intervention for weak institutions was encouraged by Congress and the regulators.[28] Chairman Greenspan, in a review of banking during the credit slowdown period, emphasized the need for reasonable balance in bank supervision in the future:

> On the bank supervisory front, we are going to have to find a reasonable balance between discouraging excessively risky loans and allowing some leeway for taking legitimate chances on lending opportunities. After we find this balance we are going to need to maintain it over the business cycle, an even more difficult task. We need to make certain that our examination standards remain cautious when loan demand is expanding at a speculative rate and do not become overly conservative at the other end of the cycle. This is not an easy activity. When a society is propelling asset values higher, it is very difficult to argue with bank management that the loans they are making may not be very well covered by collateral. And when collateral prices may be falling owing to forced liquidations of property, supervisors must keep their eyes on longer-term underlying values.[29]

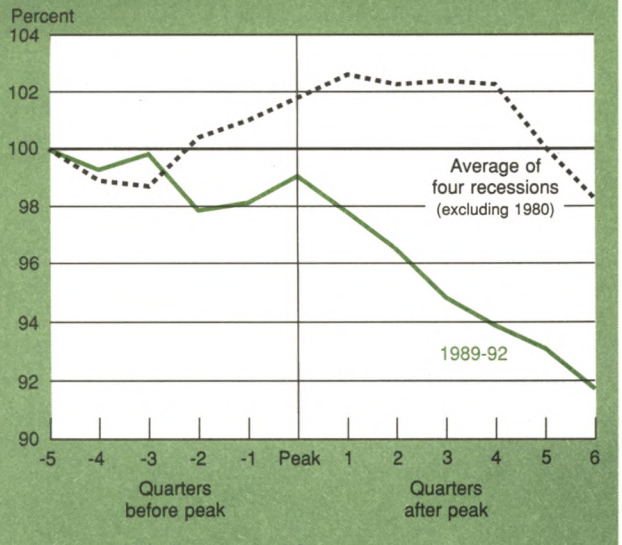
Outside the banking system, the rating agencies, insurance commissioners, and the Securities and Exchange Commission also reacted to the changing economic climate. The junk bond market collapsed in late 1989 and Drexel failed a few months later. Some insurance companies also failed and some financial firms defaulted in the commercial paper market. In response, several large insurance companies and finance companies were downgraded by the rating agencies, and insurance regulators required greater

Footnote 27 continued
Timothy Ryan in *Credit Availability*, Senate Committee on Banking, Housing, and Urban Affairs, June 21, 1990.

[28]Many of these changes were required by the *Federal Deposit Insurance Corporation Improvement Act of 1991*, enacted December 19, 1991.

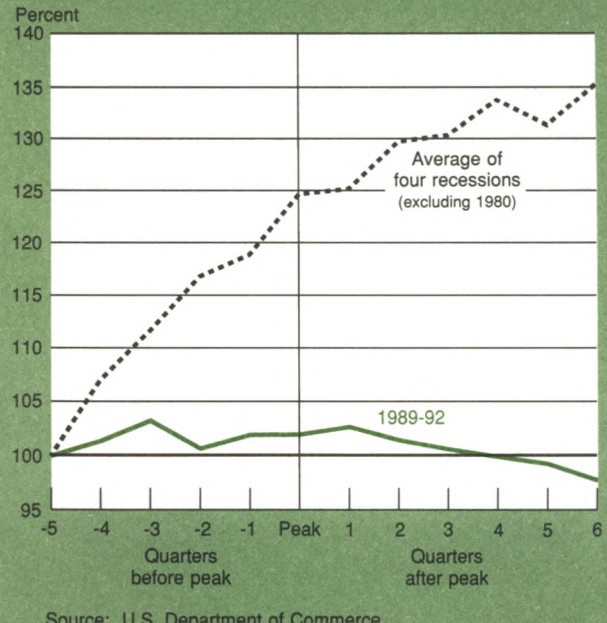
[29]Alan Greenspan, remarks before the Tax Foundation of New York, November 18, 1992, p. 7.

Chart 28
Ratio of Inventories to Final Sales
Index = 100 Five Quarters before Peak



Source: U.S. Department of Commerce.

Chart 29
Commercial and Industrial Loans
Index = 100 Five Quarters before Peak



Source: U.S. Department of Commerce.

disclosure of junk bond investments and raised related reserve requirements. As noted earlier, mutual funds were restricted in the amount of lower grade commercial paper they could hold. As a result, below-investment-grade borrowers in many cases were shut out of the long- and short-term money markets and had to seek funding from banks. The banks in turn were already downsizing, in some cases because of their own problems.

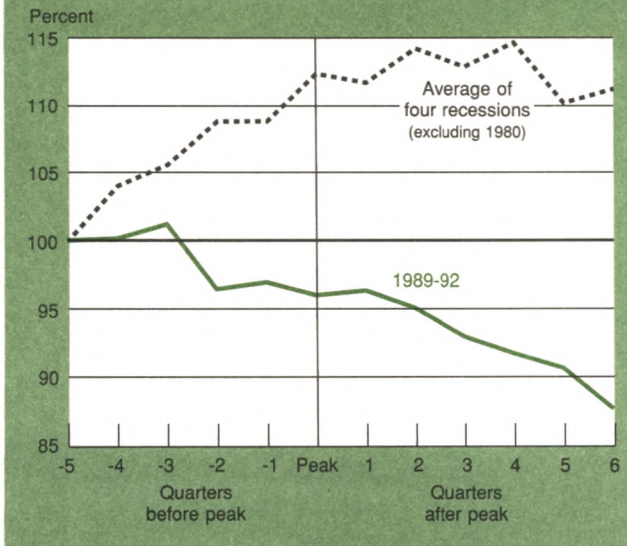
IV. Earlier credit crunches and credit cycle literature

This section reviews earlier postwar credit crunches and draws comparisons with the current episode. As the innovation and deregulation in recent years would lead one to expect, the most recent credit slowdown shows some distinctive features. This section also examines the literature on the general process of credit cycles—in particular, the writings of Fisher, Minsky, and others—and asks whether this most recent credit slowdown can be explained within a theoretical framework that does not rely on institutional rigidities such as Regulation Q ceilings to create "credit crunches." We conclude that although the particulars differ, the important stylized features of the current credit cycle can be explained by these authors' models. Our findings add considerable empirical validation to their theories, especially as the theories apply to a deregulated financial system. In particular, our results bear out the hypothesis that deregulation of financial intermediaries will *not* necessarily produce a more stable financial system free of periodic credit crunches.[30] At the end of this section, we present a composite, highly stylized model (based largely on this earlier work) of how the credit cycle can lead to credit crunches.

Chart 30

Ratio of Commercial and Industrial Loans to Final Sales of Business

Index = 100 Five Quarters before Peak



Source: U.S. Department of Commerce.

A. Comparison with earlier credit crunches

Earlier postwar credit crunch periods have been carefully described in previous studies.[31] Here we review them briefly before we identify the features that set the most recent episode apart from its predecessors. Table 4 provides a summary of earlier postwar credit crunch periods.

In the years just after the Second World War, the banking system was both highly regulated and liquid in the sense that it held a large volume of government securities. Market interest rates also tended to be quite stable. Gradually, as market rates became less stable, banks began to use the liquidity in their portfolios of government securities to make private business loans. As a result, the banking system began a large-scale reduction in their holdings of government securities. Periods of credit stringency occurred near cyclical peaks during the 1950s, resulting in some disintermediation, but without the actual or prospective failure of any major players.

Financial innovation was limited during the 1950s, although the banks did develop the federal funds market to buy and sell excess reserve balances. In researching the implications of the developing federal funds market, Minsky pointed out the likely implications of future innovations:

> As evolutionary changes in financial institutions and usages are the result of profit-seeking activities, the expectation is that such financial changes

[30] A similar conclusion was reached by Henry Kaufman in his October 9, 1991, *Wall Street Journal* article, "Credit Crunches: The Deregulators Were Wrong."

[31] For more detailed descriptions, see Wojnilower, "The Central Role of Credit Crunches in Recent Financial History"; Albert Wojnilower, "Private Credit Demand, Supply, and Crunches—How Different Are the 1980s?" *American Economic Review*, May 1985, pp. 351-56; Hyman P. Minsky, *Stabilizing an Unstable Economy* (New Haven: Yale University Press, 1986); and Martin Wolfson, *Financial Crises* (New York: M.E. Sharpe, 1986), pp. 43-124.

will occur most frequently during periods of high or rising interest rates. Such rates are evidence of a vigorous demand for financing relative to the available supply. They act as a signal to money-market professionals to seek ways of using the available lending ability more efficiently.

Table 4

Summary of Recent Credit Crunches

Credit Crunch Year	Rising Interest Rates?	Disintermediation?	Other Shocks	Recession?	Federal Reserve Easing?	Other Policy Responses	Regulatory and Market Reforms
1966	Yes	Yes	Federal Reserve sent a letter to member banks discouraging excessive lending. President and Congress also called for credit restraint	"Mini"	Yes	Regulation Q ceilings on savings accounts were held in place while ceilings on large time deposits were raised substantially. Discount window access eased	Corporate borrowers demanded formal credit lines. Banks gained access to Euromarket liquidity
1969	Yes	Yes	President and Congress called for credit restraint. Political constraints prevented banks from raising prime rate to clear the market. Penn Central default; run on commercial paper market	Yes	Yes	Regulation Q ceilings on savings accounts were increased slightly, while ceilings on large time deposits were raised substantially. Discount window access eased	Switch to policy based on monetary aggregates. Elimination of Regulation Q for large time deposits
1974	Yes	Yes	Oil shock; New York City budget crisis. Commercial real estate market collapse. Failures of Franklin National Bank and Herstatt. Prime rate held below federal funds rate	Yes	Yes	Regulation Q ceilings suspended in 1973	
1980	Yes	Yes	Change in Fed operating procedures. Oil shock; Carter credit controls	Yes	Yes	Credit controls lifted	Legislation phasing out Regulation Q ceilings
1982	Yes	Yes	Failures of Drysdale, Penn Square, and Continental Illinois. LDC debt crisis	Yes	Yes	Regulatory forbearance on LDC debt	More stringent bank capital requirements. Change in monetary policy operating procedures. Acceleration of Regulation Q phaseout
1990	Rates peaked early in 1989	Banks and thrifts lost deposits but did not bid aggressively to keep them	The thrift problem and the passage of the Financial Institutions Reform, Recovery and Enforcement Act (FIRREA) in late 1989. Collapse of markets for commercial real estate and junk bonds. Bank capital crunch	Yes	Yes	Banks encouraged to lend by regulators and politicians. Examination standards regarding commercial real estate lending were clarified. Reserve requirements reduced	Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) further tightened regulatory oversight of depository institutions

> Essentially, the relations upon which the monetary authorities base their operations are predicated upon the assumption that a given set of institutions and usages exists. If the operations of the authorities have side effects in that they induce changes in financial institutions and usages, then the relations "shift." As a result, the effects of money operations can be quite different from those desired. To the extent that institutional evolution is induced by high or rising interest rates, this would be particularly significant when the central bank is enforcing monetary constraint in an effort to halt inflationary pressures.[32]

In the 1960s, as a result of the forces described by Minsky, financial innovation became a more important theme in the financial markets. Banks began "buying money" with large certificates of deposit (CDs) and started to manage their liquidity on the liability side rather than just on the asset side or at the discount window. For a period of time, the ceiling rates on these large CDs were raised by the Federal Reserve as market rates rose, and large CDs remained a flexible liability management tool for banks. In 1966, the Federal Reserve did not raise the ceiling rate on CDs in response to accelerating inflation, and a "credit crunch"—the term coined by Sidney Homer and Henry Kaufman to describe this event—took place.[33] Disintermediation occurred, banks stopped lending, and the Federal Reserve issued a letter stating that banks could use the discount window as a source of liquidity provided that (1) the funds were not used to expand lending and (2) banks reduced their selling of municipal securities, a practice that was contributing to disorderly conditions in that market.

Following this episode, banks discovered a new liability management instrument—the Eurodollar market. Their foreign branches would acquire funds in this market and relend the funds to their domestic parents. At the same time, many banking organizations adopted the form of the bank holding company, a change that allowed them to raise funds in the commercial paper market.

The next credit crunch stemmed more from a loss of confidence than from tight monetary policy directly, although monetary policy, as in 1966, had been tightening to control inflationary pressures in 1969. The failure of Penn Central in 1970 made it difficult for many companies to roll over commercial paper. Many companies turned to their commercial banks under these circumstances to honor their loan commitments, and the Federal Reserve made it known that the banking system's less liquid assets would be made liquid at the discount window if necessary to satisfy this sudden increase in loan demand. The Federal Reserve also suspended the ceiling rate on large CDs to make this funding source available to banks during this tense period.[34]

In the 1973-74 period, monetary policy was again tightening in response to an acceleration in inflation. As in 1969-70, the failure of a major institution played a role; this time, however, the CD market, not the commercial paper market, would be affected. Initially, however, it did look as though a commercial paper crisis was brewing. Many real estate investment trusts came close to bankruptcy as a result of rising short-term rates and were unable to continue funding themselves in the commercial paper market. As a result, they were forced to rely heavily on their banks, and another "Penn Central crisis" was feared. The large banks, however, were able to make these loans and averted a crisis in the commercial paper market. In early May of 1974, Franklin National's problem became known, and in June of that year Herstatt Bank (a German bank) failed and defaulted on its foreign exchange contracts. As a result, many banks were being carefully evaluated by investors, and tiering developed in both the CD market and the Eurodollar market. To avoid a crisis in the domestic and international money markets, the Federal Reserve made a large discount window loan to Franklin and encouraged other banks to lend to Franklin. Again in this cycle, housing and the thrift industries ended up bearing most of the pain from the rise in short-term rates, and a financial panic was avoided.

In 1979-80, monetary policy again tightened in response to increasing inflation, but this time the shock was not the failure of a major player, but rather credit controls imposed by the Carter administration. This credit slowdown seemed almost irrational in the sense that banks reduced their willingness to lend and consumers curtailed their use of credit and cut spending to a much greater extent than the credit controls demanded. Thrift institutions were protected somewhat from disintermediation by six-month certificates with floating rate ceilings, but their cost of funds increased sharply relative to the returns on their mortgage assets, generating large operating losses.

The 1981-82 recession followed a period of high and volatile interest rates. Once the recession began, the

[32] Hyman Minsky, "Central Banking and Money Market Changes," *Quarterly Journal of Economics*, May 1957, p. 172.

[33] Sidney Homer, "Does '66 Add Up to a Credit Squeeze or a Credit Crunch?" *The Commercial and Financial Chronicle*, September 29, 1966.

[34] A detailed analysis of this episode can be found in Thomas Timlen, "Commercial Paper—Penn Central and Others," in Edward Altman and Arnold Sametz, eds., *Financial Crises* (New York: John Wiley and Sons, 1977).

financial markets became nervous after the failures of Drysdale and Penn Square and the threatened default by Mexico on $80 billion of bank loans. Investors became very cautious and attempted to substitute Treasury securities for the CDs of the exposed banks. Eventually Mexico's debts were refinanced, as were the debts of Argentina and Brazil. Although housing and the thrift industry were strongly affected during the 1979-82 period, a process of deregulation was occurring that would tend by the late 1980s to insulate housing somewhat from future tightening in monetary policy, at least in the sense that credit flows would not be disrupted but available at a price. Even capital requirements would not be a constraint for mortgage lending because the loans could be originated and immediately sold in the securitized mortgage market.

In general, earlier credit crunches tended to occur near cyclical peaks in business cycles and were often exacerbated by other shocks stemming from financial failures or credit restrictions. Tighter monetary policy was usually part of the scene, and market rates exceeding Regulation Q limits typically played a role, with severe consequences for the housing industry. In some cases, interest rates in excess of state usury ceilings also disrupted the flows of credit to certain sectors, predominantly housing.

In contrast, in this latest episode neither an extremely tight monetary policy nor Regulation Q ceilings played a role. Speculation and excessive lending in real estate were important factors. However, the deregulation and innovation of the 1980s were not able to prevent credit disruptions during the correction phase. Indeed, it could be argued that innovation and deregulation may have made the situation worse by enabling consumers and businesses to acquire heavy debt burdens. The accumulation of debt ultimately led to a situation in which lower desired leverage ratios from the demand side and more cautious lending from the supply side could combine to produce a substantial slowing in credit growth. Also on the supply side, advances in information technology may have put financial intermediaries in a weaker position by giving their traditional customers direct access to the money market and forcing the intermediaries to compete for lower quality lending. Weak financial intermediaries in turn contributed to the abnormally slow recovery by reducing lending to firms dependent on intermediated credit as problems with real estate and other loans made earlier became apparent. The consolidation and downsizing of the banking and thrift industries that accompanied this process seemed to produce a more cautious lending environment for strong and weak institutions and raised issues about the role of the regulators in the credit slowdown. Finally, the tax law changes in 1981 and 1986 added to the severity of the commercial real estate cycle.

No doubt, opinions about the importance of individual factors in producing the recent credit slowdown will change as more research is completed on this latest episode. Nonetheless, we believe that the factors we have cited will continue to be regarded as the salient features of the 1989-91 credit slowdown and as the features that helped distinguish it from earlier postwar episodes.

B. The credit cycle literature

Despite the differences between this credit slowdown and previous postwar episodes, earlier literature on the credit cycle, and particularly the work of Fisher and Minsky, still has relevance to the most recent experience. Indeed, a passage from Minsky's work in 1964 offers an apt analysis of the real estate problem during 1989-91:

> Once capital gains in real estate become "expected" then the development and construction of real property can be undertaken in order to take advantage of such opportunities for capital gains. An investment boom in real estate can occur, which will sustain the growth process. But a boom based upon extrapolation of existing rates of change of asset prices can result in the construction of more of such assets than current demand can use. As a result the boom in time can lead to an oversupply which in time will tend to lower asset values.
>
> If the market value of an asset declines, then the unit owning the asset has a realized or unrealized capital loss depending upon whether or not it sells the asset. These capital losses decrease the net worth of the unit if we measure all asset values as current market values. This decreases the unit's ability to borrow. If the decrease in the market value of the assets it owns is so great as to make the net worth of the unit negative, then the owners of the unit's debt liabilities will choose to exercise whatever powers they have to force payment and certainly a negative net worth unit will not be able to get its debts extended or refunded. Hence the decline in the market value of assets, by decreasing the protection that a unit's net worth provides for the lenders, decreases the likelihood that a unit which needs to acquire cash by issuing its debt can do so.
>
> The effort to meet money flow commitments by selling assets is a crucial step in the process by which financial distress is generalized into a financial crisis. If a unit needs money and the only way it can acquire money is by selling its financial or real

assets, it is putting pressure on the market for this asset. Its actions will tend to lower the price of the asset. If other units are in the same predicament, then the price of the asset will have to fall until there are units which are willing to take a position in the asset. However it is not only the units in need of money which are suffering financial losses because of the decline in the market value of this asset, but all units that own this asset.[35]

Likewise, Irving Fisher emphasized the interaction of debt and speculation in describing business and credit cycles many years ago:

> Thus, over-investment and over-speculation are often important; but they would have far less serious results were they not conducted with borrowed money. That is, over-indebtedness may lend importance to over-investment or to over-speculation. The same is true as to over-confidence. I fancy that over-confidence seldom does any great harm except when, as, and if, it beguiles its victims into debt.[36]

The most recent overinvestment cycle in commercial real estate was induced by expectations of rising asset prices and by strong demand sustained with borrowed money. Once again, the leveraging process contributed to the cycle on both the "up" side and the "down" side, as lenders pulled back as soon as it became evident that the expectations of asset prices were too optimistic. Those borrowers who routinely rolled over existing short-term debt or who took on new debt to service existing debt faced serious difficulties.

Minsky refers to these arrangements as speculative financing and Ponzi financing, respectively. Both are pivotal in the endogenous process of credit cycles because the borrowers who rely on them are vulnerable not only to changes in general economic conditions but also to disruptions in their financing arrangements when asset values decline or lender confidence falls.[37]

Minsky has repeatedly emphasized not only the endogeneity of the credit cycle but also the likelihood of periodic financial crises:

> To put my argument bluntly, the incipient financial crises of 1966, 1969-1970, and 1974-1975 were neither accidents nor the result of policy errors, but the result of the normal functioning of our particular economy. The cumulative changes that occurred in the financial structure over 1945-1965 resulted from profit-seeking activity in our economy, an economy that uses decentralized markets not only to produce and distribute but also to deal in capital assets and finance investment. As a result of normal market behavior the extraordinarily robust financial structure inherited from World War II, in which a financial crisis was a virtual impossibility, was transformed into the fragile structure we now have, in which the periodic triggering of a financial crisis is well nigh certain.[38]

Following Minsky and Irving Fisher, other economists, including Otto Eckstein and Allen Sinai, have represented credit crunches as an endogenous part of the business cycle.[39] Sinai has undertaken a substantial effort to incorporate endogenous credit cycles in a large econometric model.[40]

Other authors have also built on this earlier work. Benjamin Friedman, in commenting on the likely consequences of the increased use of debt in the U.S. economy during the 1980s, echoed a theme familiar from the work of Minsky and Fisher:

> The massive increase in business indebtedness has raised concerns that it will make the U.S. economy excessively fragile in the face of downward shocks. The chief danger posed by an overextended debt structure in this context is that the failure of some borrowers to meet their obligations will lead to cash flow inadequacies for their cred-

[35]Minsky, "Financial Crisis, Financial Systems, and the Performance of the U.S. Economy," p. 247 and pp. 259-60.

[36]Irving Fisher, "The Debt-Deflation Theory of the Great Depression," *Econometrica*, vol. 1, no. 4 (October 1933), p. 341. For a careful analysis of Fisher's views, see Gottfried Haberler, *Prosperity and Depression* (London: George Allen & Unwin, 1964). Haberler stresses:

> It may, however, readily be admitted that the repercussions of the breakdown of the investment boom are likely to be much more severe where the investments have been financed with borrowed money. We may thus conclude that the "debt-factor" plays an independent role as an intensifier of the depression, but can hardly be regarded as an independent cause of the breakdown.

[37]Hyman P. Minsky, *Stabilizing an Unstable Economy* (New Haven: Yale University Press, 1986), pp. 206-13.

[38]Hyman P. Minsky, "A Theory of Systemic Fragility," in Edward Altman and Arnold Sametz, eds., *Financial Crises* (New York: John Wiley and Sons, 1977), p. 139.

[39]We do not mean to imply that these analysts necessarily interpret this credit crunch process in exactly the same way. For an interesting attempt to delineate the similarities and differences and to trace the historical origins of this view back to Thorstein Veblen and Wesley Clair Mitchell, see Wolfson, *Financial Crises*.

[40]A detailed description can be found in Allen Sinai, "Financial and Real Business Cycles," *Eastern Economic Journal*, vol. 18, no. 1 (Winter 1992). For further discussion of credit crunches as part of an endogenous cyclical process, see Otto Eckstein and Allen Sinai, "The Mechanism of the Business Cycle in the Postwar Era," in Robert Gordon, ed., *The American Business Cycle* (Chicago: University of Chicago Press, 1986), pp. 39-122.

itors—who may, in turn, also be borrowers, and so on—and that both borrowers and creditors facing insufficient cash flows will then be forced to curtail their spending. Similarly, forced disposal of assets by debtors and others facing insufficient cash flows will lead to declines in asset prices that erode the ability of other asset owners to realize the expected value of their holdings if sale becomes necessary, and will therefore threaten the solvency (in a balance sheet sense) of still others.[41]

More recently, Friedman has extended the logic of this argument to assign an explicit role to the "credit channel" (in the Bernanke-Blinder model) in this most recent cycle:

> A fundamental feature of debt markets, which the discussion of U.S. business leveraging has too often overlooked, is that each transaction has both a borrower and a lender. When a borrower defaults, some lender takes a loss. When a borrower's likelihood of meeting its obligations erodes, the expected value of some lender's claim declines. These losses and declines in value represent reductions in the net worth, or capital, of lenders. In a financial system in which many lenders are themselves highly leveraged intermediaries that must meet minimum capital requirements, these losses and declines in value therefore impair their ability to extend new credits or renew old ones. Especially when the intermediaries in question represent the only plausible source of credit for specific would-be borrowers—for example, in the case of small businesses with just one or a few well-developed banking relationships—borrowers' ability to obtain credit is impaired as well. In short, the entire market becomes more imperfect.[42]

In other words, deflated asset values and disruptions of cash flows lead to financial strains and reduced credit availability that can cause output to decline (or grow more slowly) as units adjust to the situation by reducing spending.[43]

[41]Benjamin Friedman, "Changing Effects of Monetary Policy on Real Economic Activity," in *Monetary Policy Issues in the 1990s*, Federal Reserve Bank of Kansas City, 1989.

[42]Benjamin Friedman, "Financial Roadblocks on the Route to Economic Prosperity," *Challenge*, March-April 1992, pp. 25-34.

[43]Central to the views of the analysts reviewed in this section is the notion that large debt burdens can be destabilizing. Similar arguments can be found in Henry Kaufman, "Debt: The Threat to Economic and Financial Stability," and Benjamin Friedman, "Increasing Indebtedness and Financial Stability in the United States," in *Debt, Financial Stability, and Public Policy*. In more recent work, some analysts have de-emphasized the level of debt burdens per se, and have focused more on the equity positions of borrowers, arguing that as borrowers risk less of their own wealth in a given project, they have less in common with the interests of their lenders. For more detail, see Ben Bernanke and Mark Gertler, "Financial Fragility and Economic Performance," *Quarterly Journal of Economics*, February 1990, pp. 87-114. Still others argue that heavy debt burdens are actually good for corporations because managers have less uncommitted cash flow to use for inefficient investments. See Michael Jensen, "Takeovers: Their Causes and Consequences," *Journal of Economic Perspectives*, vol. 2 (1988), pp. 21-48.

In a sense, recent events, when viewed in the context of this earlier theoretical and empirical work, should not appear especially surprising. Economists have achieved a basic theoretical understanding of how financial innovation, excessive debt, financial strains, and slow growth interact, as well as an understanding of the process through which the correction occurs.

Using the information and ideas discussed in this section, we can chart how the credit cycle leads to a credit crunch and identify the important interactions between finance and economic activity. The process can be viewed as consisting of ten basic steps:

(1) There is an increase in the demand for new capital assets, that is, investment increases. This increase in investment could stem from an expansionary monetary or fiscal policy that is increasing the demand for the output or services produced by the capital assets and thereby increasing the value of these assets; or investment in the capital assets could occur because of a boom in the stock market that increases the market value of the existing assets. Alternatively, an upward shift in inflationary expectations could motivate investors to hold real as opposed to financial assets. In any case, a wider spread is opened up between the price of existing capital assets and the cost of creating (building) new capital assets, and additional investment takes place to take advantage of profit opportunities. This first step can be conceptualized either in terms of Tobin's Q model or Minsky's two-price model.

(2) These larger capital asset positions are financed with borrowed money and through reductions in overall liquidity. The assets, in turn, are often pledged as collateral, and lenders, no doubt, are aware that these asset prices are appreciating more rapidly in value, giving the lenders a false sense of security and resulting in some cases in a lowering of credit standards. At this point, finance has become an important part of the process.

(3) In some cases, maintaining the positions in these assets with borrowed money requires continually rolling over short-term debt or even increasing debt to

make interest payments on existing debt. These financing arrangements increase the vulnerability of the financial system to shocks.

(4) At some point, expectations about increased profits and continued asset price appreciation shift downward, perhaps because of a slowing in aggregate demand as monetary or fiscal policy tightens to control inflation, or because of an external shock to the economy. A third possible explanation is that a large increase in the supply of assets comes on the market with a lag in response to the earlier large price increases, putting downward pressure on the price of the output or services produced by these capital assets. In any case, the capital assets, new and existing, do not produce the expected cash flows and profits, and asset prices begin to decline.

(5) Falling collateral values and the resulting decline in the equity positions of debtors, along with the reduced ability of debtors to make the payments on their loans, create a divergence in the interests of debtors and lenders: debtors are looking to refinance under difficult circumstances and lenders want to be repaid while debtors still have positive equity (here begins the credit crunch part of the story).

(6) Expected cash payments are not received and loans are not rolled over, spreading distress among more economic units.

(7) Assets are dumped on the market to raise cash, and asset prices decline further. At this point, some players may become insolvent; a process of contagion can raise questions about other players (both debtors and lenders), who may be perceived to be in a similar situation or to have similar exposures. In this climate of uncertainty, investors may begin a general flight to quality (possibly creating the need for lender-of-last-resort intervention).

(8) Some of the loans become nonperforming and eventually are written off by the financial intermediaries.

(9) As a result, highly leveraged financial intermediaries take a hit to their capital, an outcome that leads to greater regulatory scrutiny and impedes the intermediaries' ability to make loans to financially sound economic units. What Bernanke, Blinder, and others call the "credit channel" becomes blocked to at least some degree. Through this channel, the credit crunch can be spread to economic units that were not part of the "excesses" that created the credit crunch.

(10) Economic units, sound and weak alike, adjust to the situation by reducing their spending, and economic activity slows further, prolonging the period of substandard economic performance.

When a credit crunch (steps 6 through 9) is viewed in terms of a more general credit cycle model, it appears that the unique features of each cycle will tend to be the individual "accidents" or the particular points of stress rather than the process itself, although clearly the cyclical swings themselves can be amplified by deregulation, financial innovation, the level of debt burdens, tax law changes, and other institutional changes. The credit cycle model outlined here is general enough to be consistent with the view that the credit cycle is an inherent feature of our financial system or with the view that credit cycles are generated by monetary or fiscal policy or other exogenous shocks. Whatever the precise nature of the credit cycle may be, such episodes underscore the importance of the relationships between finance and economic activity during both the expansion and the contraction phases of the investment cycle.

V. Concluding remarks

We conclude our discussion by offering a few, more speculative reflections in light of the recent credit slowdown experience:

(1) The credit cycle phenomenon, with its interaction of supply and demand side factors on both the "up" side and the "down" side of the business cycle, appears to have contributed significantly to the recent period of recession followed by weak recovery. Nevertheless, it has by no means been the only factor in this experience. Other factors include the beginning of the Gulf War, the defense build-down following the end of the cold war, and the pressure on U.S. companies to engage in major corporate restructuring and to reduce personnel now perceived to be redundant in a more internationally competitive environment.

(2) The credit cycle phenomenon has not been unique to the United States; indeed, it has been a conspicuous factor in many other countries, including the United Kingdom, Australia, Japan, and some Scandinavian countries.

(3) One of the most striking features of the recent credit cycle has been the crisis that never happened. True, many shocks occurred in the form of failures of major financial and nonfinancial firms, and during some periods financial markets and institutions seemed quite vulnerable to such shocks. Moreover, the cumulative adverse effects of a prolonged period

of weak business activity were no doubt quite substantial. Still, no crisis of the kind that accompanied prewar credit cycles took place in 1989-91. Earlier crises often took the form of massive waves of bankruptcies, sudden forced dumpings of financial and commodity assets on vulnerable markets, and sharp liquidity shortages leading to steep spikes in short-term rates and sharply inverted yield curves. The failure of such a crisis to occur this time *may* reflect the successful application of more flexible monetary policy tools and federal deposit insurance, resources that were unavailable or available to a much lesser extent in earlier episodes.

(4) Efforts to devise single-cause theories of the business cycle are probably misplaced. Business fluctuations probably can stem and have stemmed from various causes at different times and in different places. But the phenomenon of credit cycles, as outlined here and as experienced in the recent past, must figure importantly in any realistically eclectic theory of the business cycle.

Appendix: Definitions of Terms

This appendix provides more precise definitions of terms used in the text to describe various credit phenomena. We define a *credit slowdown* as a general decline in credit growth that may have been caused by either demand or supply factors, or both. Broad changes in the demand for credit may be cyclically induced, varying with the pace of economic activity, or structurally induced, responding to changes in the tax code or to managerial innovation such as just-in-time inventory control. Credit supply can be affected by changes in financial regulations, structures, and institutions. Both credit supply and demand will be influenced by monetary policy and by "autonomous shifts" in lender and borrower psychology.

While *credit slowdown* is a fairly inclusive term, *credit crunch* refers specifically to a reduction in the available supply of credit.† During previous credit crunches, lenders often became reluctant to lend either because they had funding problems stemming from disintermediation or because their regulators had urged credit restraint. In the current episode, however, the reluctance to lend may have resulted from lenders' own balance sheet weaknesses (capital constraints) and their reassessments of borrowers' average credit quality. Although we regard credit crunches as primarily supply phenomena, it is difficult to disentangle supply from demand effects because some of the same factors that may reduce the willingness to lend may also restrain the desire to borrow. During the recent credit slowdown, for example, the decline in the strength of borrowers' balance sheets and the decline in the profitability of most real estate investments reduced the willingness both to lend and to borrow.

A credit crunch implies changes in the relationship between credit availability and interest rates: (1) less credit may be available over a wide range of interest rates, a condition consistent with a shift in a credit supply schedule, or (2) the reduction in credit availability may bear little relation to the level of rates, a condition that occurs when allocation takes place through nonprice mechanisms. Because credit is normally allocated across potential borrowers by the interest rate, common usage reserves the term *credit rationing* for situations in which the supply of credit is allocated through nonprice mechanisms. We consider credit rationing episodes to be a subset of credit crunches in which the interest rate is not the price credit allocation mechanism.‡ Credit crunches that are characterized by credit rationing may be difficult to alleviate with monetary policy alone.

During a credit crunch with rationing, borrowers may perceive changes in the terms on which credit is made available, such as qualifying standards or the length of the business relationship. These nonprice terms of credit are often relied upon to sort borrowers as lenders try to cut back on loans. When the nonprice terms of credit change, borrowers and lenders may have differing opinions about whether credit standards have tightened. This occurs, for example, when lenders but not borrowers reduce their valuations of certain forms of collateral or their estimates of the likely profitability of certain investment projects. If a credit slowdown arises from balance sheet concerns and a credit crunch is associated with changes in the nonprice terms of credit, there may be little effective trade-off between the level of interest rates and credit availability.

As deregulation and recent financial innovations gave market forces a greater role in allocating available credit, it was expected that abrupt disruptions of credit flows

†Most analysts regard credit crunches as disruptions in the credit supply process. A review of the various definitions that have appeared in the literature can be found in Raymond Owens and Stacey Schreft, "Identifying Credit Crunches," Federal Reserve Bank of Richmond, Working Paper no. 92-1, March 1992.

‡Owens and Schreft, in "Identifying Credit Crunches," argue that nonprice rationing is a defining characteristic of credit crunches; however, they acknowledge that the economic profession is split on this issue.

Appendix: Definitions of Terms *(Continued)*

through rationing would diminish. Instead, the last decade witnessed an apparent "overshooting" of equilibrium credit levels, and the excess credit growth was corrected through both rationing and interest rate changes. A credit crunch today that exhibits elements of credit rationing may still have particularly adverse macroeconomic consequences if the flow of credit is shut off for critical markets or borrowers.

Credit rationing can take three forms.[§] During the recent credit crunch, all three may have appeared in combination.

Pure rationing occurs when some borrowers are denied credit while otherwise identical borrowers receive credit. In this case, the lender has set an interest rate at which the demand for funds exceeds the supply. Theoretical models show that this behavior is an efficient response to potential adverse selection problems: setting a higher interest rate may attract only riskier borrowers.

Divergent views rationing occurs when borrowers would like to borrow at prevailing rates and feel their loans do not present a serious credit risk, but the lenders disagree and refuse to lend. In this situation, borrowers who cannot obtain credit at the prevailing interest rate may conclude that the lenders are rationing credit. Borrowers and lenders often differ on the appropriate criteria for judging the ability to take on debt. For example, lenders may place more weight on collateral valuation, whereas borrowers may focus on their projected cash flow and ability to stay current with interest payments. Even when borrowers and lenders agree on the appropriate criteria, they may have different forecasts for future asset prices and cash flows.

Sectoral rationing refers to the application of credit standards that effectively shut off the flow of credit to entire sectors, such as certain classes of borrowers or types of borrowing. For some borrowing sectors, lenders may find it difficult to distinguish between good and bad credits and therefore choose to make no loans at all. Sectoral rationing appears in combination with divergent views rationing when borrowers have private information or different views about their own creditworthiness.

In the current slowdown, divergent views and sectoral credit rationing clearly increased, particularly in the commercial real estate sector and for borrowers whose loans would be classified as highly leveraged transactions. Pure credit rationing probably appeared in combination with these other forms of rationing as banks sought to reduce the size of their overall balance sheets.

[§]This discussion closely follows the literature review by Dwight Jaffee and Joseph Stiglitz, "Credit Rationing," in Benjamin Friedman and Frank Hahn, eds., *Handbook of Monetary Economics*, vol. 2 (1990), pp. 838-88.

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Comments on "Perspective on the Credit Slowdown"

The Minsky Cycle in Action: But Why?

*by Benjamin M. Friedman**

One of the things economists most dislike talking about is people's attitudes. But that does not make them any less important in accounting for the behavior economists seek to understand.

The subtheme that continually struggles to poke its head above the surface of Richard Cantor and John Wenninger's useful review of recent experience in the U.S. credit markets is the radical change in attitude toward the use of debt that occurred at the outset of the 1983-90 business expansion. As Cantor and Wenninger's detailed recounting of that experience makes clear, on both the demand side and the supply side the credit contraction of 1990-92 was a direct consequence of the dramatic increase in proclivity toward leverage during the preceding half-decade. While it is easy to point to one or another factor of an objective kind that may have played some minor role in accounting for that increased proclivity toward leverage, none seems capable of having motivated the truly massive change in business financing practices that occurred. We are therefore left, I believe, with a change in practice driven largely by a change in attitude among the practitioners. And as Hyman Minsky correctly argued years ago, changes of this kind, especially in the credit markets, inevitably breed their own reversal.[1]

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[1]Hyman Minsky, "The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to 'Standard' Theory," *Nebraska Journal of Economics and Business*, 16 (Winter 1977), 5-16.

The major part of Cantor and Wenninger's effort in this paper lies in documenting the credit market developments surrounding the 1990-91 recession and the unusually slow recovery that followed. The chief burden of their analysis is to show that the slowdown in credit extensions during this period—a slowdown of a magnitude and breadth that had been unprecedented in the post-World War II era—reflected a contractionary tendency on the part of lenders as well as borrowers. Given the well-known difficulties of identifying shifts in credit supply behavior, the evidence they produce bears this burden reasonably well.

Unraveling the separate roles of supply and demand can be a challenging task in any market setting. Credit markets are even more problematic in this context, however, not only because the observable price of credit (the interest rate on a loan) is typically but one element among many that together constitute the relevant price as seen by borrowers and lenders, but also—and more fundamentally—because credit market phenomena importantly affect economic activity at the aggregate level. Suppose, for example, that the only shock to the economy has been a sharp reduction in lenders' willingness to advance credit, and that this negative shock to credit supply has induced a decline in aggregate economic activity. Further suppose that the resulting decline in aggregate activity has in turn induced potential borrowers to demand less credit (because credit demand is plausibly conditional not just on price but also on the volume of business to be financed). Then both bankers and economists may accurately report that the weakness of lending volume was largely due to

the absence of loan demand, even though in a more basic sense the only shock that disturbed the economy was to loan supply. Indeed, in the presence of noisy measurements, the econometrician in this case could even find that that part of the weakness in credit volume attributable to supply behavior was not statistically different from zero at standard significance levels, and therefore conclude that weak demand was the *only* force at work.

How, then, should we assess evidence of the kind emphasized by Cantor and Wenninger—or, similarly, by other recent explorers of this question such as Ben Bernanke and Cara Lown?[2] To be sure, their research has not identified unambiguous proof of a disruption to credit supply. Instead, the evidence is suggestive and indirect. But in light of the difficulties to which this line of inquiry is necessarily subject, and in the wake of decades of unsuccessful attempts to document "credit rationing" and other analogous phenomena, I am inclined to see this glass as more half-full than half-empty. I think Cantor and Wenninger are right to conclude that a contraction of lenders' willingness to lend accounts for a material part of the actual credit slowdown we have experienced, and right also to suggest that this restrictiveness of credit supply may well have retarded nonfinanciai economic activity in the period under study.

The more over-reaching objective of Cantor and Wenninger's paper, of course, is to gain an understanding of just how all this came about. Explicitly placing their analysis in the context of Minsky's contributions, they argue that credit demand and credit supply have *both* contracted in large part as a consequence of the enormous increase in credit borrowed and lent during the latter half of the 1980s. Many borrowers, especially businesses but also including some individuals, had expanded their liabilities to the point that their earnings streams, even under the most optimistic expectations, were insufficient to service yet additional obligations. Many lenders had stretched their balance sheets to the breaking point, and many of these actually experienced just such a break when their customers' inability to meet the obligations they had incurred fractured their own capital positions. Just as Minsky described, the proclivity toward greater debt eventually ran to excess. And also as Minsky described, that excess bred its own reversal.

But the deeper question, raised by Minsky but never satisfactorily answered, remains: Why did the credit excess of this earlier period achieve such extraordinary momentum in the first place? Why did the American business and financial communities turn their backs on balance sheet and interest coverage norms that had governed their behavior for decades? How did bankruptcy and default evolve from a mortifying embarrassment, indelibly staining a corporate manager's record (if not personal integrity as well), into a conventional way of doing business? What accounted for the metamorphosis of "sound finance" from a precept to an epithet?

The distinguishing hallmark of the 1980s leverage movement is that it was just that: an increase in *leverage*. In particular, it was not the financing of an investment boom. While American businesses borrowed in record volume during the mid- to latter 1980s, these years were a poor period for investment in new earning assets. Of just over $1 trillion in net new borrowing undertaken by U.S. nonfinanciai corporations during 1984-89, almost $600 billion went into acquisitions, leveraged buyouts, stock buybacks, and other forms of equity paydowns. Although this move to greater leverage is implicit in much of what Cantor and Wenninger write, it is curious that, at the end of their paper, they begin their ten-step outline of the "credit cycle" by positing an increase in capital investment. That is simply not what happened in the 1980s. There was no surge in the demand for investment. Instead, there was a surge in the demand for leverage.

Once the leverage phenomenon gathered momentum, it is easy enough to see why lenders willingly played their role in financing it. Cantor and Wenninger correctly note (although I wish they had emphasized it more) the perverse incentives created by the combination of deposit insurance and limited liability. Given these perverse incentives, effective regulation and supervision assume paramount importance, especially for thinly capitalized depository intermediaries. But of course, as they point out, lax regulation and inadequate supervision were also part of the order of the day; the radical change in attitudes toward debt in the 1980s extended to the public sector as well, and not just in the now all too familiar sense of chronically irresponsible fiscal policy. Placed in perspective, Cantor and Wenninger's negative conclusion on the role of technological advances in facilitating these financial activities is a further reflection of the same general point: when incentives are perverse, both deregulation and technological innovation—or, for that matter, anything else that renders market participants more readily able to respond to those incentives—do not necessarily lead to improved outcomes. Finally, the competitive pressure on financial institutions that themselves must compete in a speculative market to obtain the capital that is the essential raw material of any intermediary's business throws up yet further perverse incentives to buttress

[2]Ben S. Bernanke and Cara S. Lown, "The Credit Crunch," *Brooking Papers on Economic Activity*, 1991:2, 205-39.

those already created by deposit insurance and limited liability. Once even a few lenders assume dangerously aggressive postures, it becomes entirely rational—indeed, competitively necessary—for others to do so as well. In sum, there was no lack of incentives for lenders to finance even patently excessive demands for credit, as long as they were both able and allowed to do so.

At the same time, there was also no lack of intellectual rationalizations for ever greater credit demands as leverage rose. Michael Jensen, for example, suggested several apparently plausible reasons why higher leverage was potentially in the economy's interest.[3] Jensen's basic argument was that debt creation without retention of proceeds would reduce firms' net free cash flow, thereby increasing internal incentives to efficiency and, over time, increasing profitability and hence the ability to service the added debt. Further, highly levered capital structures would reduce creditors' incentive to force liquidation in the event that these anticipated efficiency gains, and consequent higher earnings, did not materialize. While Steven Kaplan and others have found some statistically significant evidence to support the first contention, the economically significant point is that too few borrowers actually generated the higher earnings that would have been necessary to avoid the debt problems discussed at length by Cantor and Wenninger.[4] And when they did not, the fact that liquidation was not the dominant option was of small comfort to the lenders that had advanced the funds and subsequently took the losses.

The leverage movement of the 1980s therefore proceeded along just the path Minsky had suggested. The flow accelerated until it became a flood. As it gathered momentum, it also became less discriminating. Firms that underwent leverage-increasing transactions during 1984-86 differed on average from those that did not, along several familiar dimensions indicating the likely existence of unused debt capacity. Leveraged buyout targets during these early years tended to have more stable cash flows, or more need to shelter earnings from taxation, or larger working capital positions relative to total capitalization, than otherwise comparable firms that did not undergo leveraged buyouts. By 1987-89, however, these differences had vanished. Firms taking on higher leverage were largely indistinguishable from other firms, except for the higher leverage itself.[5] The aftermath—the endogenous reversal, as theorized by Minsky—was the overburdened nonfinancial sector and the weakened credit-creating institutions described by Cantor and Wenninger.

Gordon Wood, in his recent prize-winning book on the American Revolution and its consequences for our nation in its infancy, concluded that the numerous bankruptcies and financial collapses of the 1790s contributed greatly to the democratization of American society.[6] I doubt, however, that many citizens—and certainly not many of our central bankers—would today welcome a further round of democratization achieved by this mechanism.

In the end, we have a fairly coherent story of what happened in the 1980s, and then during the most recent few years, but the fundamental question still remains: why? Why the enormous change in attitude toward debt in the first place? Minsky never explained it. It is hardly a severe criticism to report that Cantor and Wenninger haven't either.

[3]Michael C. Jensen, "Agency Costs of Free Cash Flow, Corporation Finance and Takeovers," *American Economic Review*, 76 (May 1986), 323-29.

[4]Steven Kaplan, "Management Buyouts: Efficiency Gains or Value Transfers," Harvard Business School, 1987, mimeo.

[5]Christopher J. Fox, *Changes in the Insolvency Risk of LBO Transactions: Evidence from the 1980s*, unpublished thesis, Harvard University, 1990.

[6]Gordon S. Wood, *The Radicalism of the American Revolution* (New York: Alfred A. Knopf, 1992).

Financial and Credit Cycles—Generic or Episodic?

*by Allen Sinai**

Introduction

The paper by Cantor and Wenninger is largely a descriptive analysis of the 1989-92 credit cycle, its characteristics, and the process. Because of a pronounced, prolonged reduction in the growth of credit, widespread complaints by potential borrowers, and anecdotal evidence that credit has not been available, the behavior of credit during this period is a subject for study. Cantor and Wenninger seek to determine whether the episode is best depicted as a credit slowdown, credit crunch, or something uniquely different.

The authors examine and analyze data on credit growth and the supply side of lending, draw comparisons with prior situations of credit restraint, and try to determine if and how this latest episode fits previous models of the credit cycle. They conclude with a scenario model of the credit cycle and credit crunches that describes interactions between finance and the economy through a stagewise series of characteristics depicting the process.

The paper makes a number of worthwhile and useful contributions by analyzing what happened to credit during the period, why, and at what institutions. The authors home in on the role of banks, stressing this essential element of the credit-supplying process. In addition, considerable attention is paid to the role of the bank regulators, a possible cause of a crunch in lending from the supply side. Useful data are presented that measure credit availability, including borrower surveys (from the National Federation of Independent Business), lenders' surveys (the Senior Loan Officers Opinion Survey conducted by the Federal Reserve Board), and information on standards of creditworthiness for various types of loans (Senior Loan Officers Opinion Survey). These data provide valuable information on whether a credit crunch might have occurred and when, and are a future source for monitoring the presence of a crunch.

But the paper is wanting in demonstrating how this latest episode fits in with others and relates to endogenous credit cycles, despite conclusions that "the credit cycle phenomenon...appears to have contributed significantly to the recent period of recession followed by weak recovery" and that "the credit cycle model outlined here is general enough to be consistent with the view that the credit cycle is an inherent feature of our financial system."

It is this aspect of the paper that I wish to focus on, since the episode, when viewed over the time frame of 1987-91, does seem to show the same underlying processes that have characterized all financial cycles. By focusing on one aspect of the credit cycle—credit growth and the role of banks in supplying credit during 1989-90, a definite contribution in a descriptive historical sense—the authors fail to emphasize the essential ingredients of the credit, or financial, cycle that are germane to business cycles. As a consequence, the historical account of the credit slowdown and the comparison with past episodes are too limited. The more general character of these financial events and processes is not captured. The systematic and interrelated nature of financial and real economic phenomena thus cannot be fully appreciated and understood.

A definitive theme of the Fisher (1933), Minsky (1975) (1977), Eckstein-Sinai (1986), Sinai (1976) (1992), and, recently, Benjamin M. Friedman (1989) work on credit crunches and financial crises has been the systemic, endogenous, and generic-like nature of these episodes which, if so, should make them subject to characterization within a coherent framework.

Whether the credit slowdown in the United States from 1989 to 1992 was an isolated incident or part of a generic business cycle process is a matter of considerable importance, not just for the study of the business cycle and its causes, but also for monetary policy. As long as each episode of this sort is viewed as isolated and disconnected, monetary policy may hold back and not respond in any particular way, awaiting further information and events. If, however, an episode is thought to be part of an endogenous business cycle process, recognizable and systematic, monetary policy might be practiced differently, perhaps more efficiently, during a credit slowdown; in particular, it might move more quickly to reduce interest rates, always a key to reversing or cushioning the negative economic effects

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from a credit crunch process.

The conclusion of Cantor and Wenninger that "the phenomenon of credit cycles, as outlined here and as experienced in the recent past, must figure importantly in any realistically eclectic theory of the business cycle" is essentially correct. In addition, the observation that the phenomenon may be universal (my word, not the authors'), "a conspicuous factor in many other countries, including the United Kingdom, Australia, Japan, and some Scandinavian countries," is well taken.

Japan, in particular, has been in a financially fragile state, with its economy overwhelmed and thrust into a Western-style recession through a crunch process that was preceded by a boom and rising inflation, a tight monetary policy, high and rising interest rates, asset deflation and debt-deflation, speculative finance, negative effects from disappointed expectations concerning profits and incomes, balance sheet deterioration, weakened and overleveraged financial institutions, a credit slowdown, a credit crunch, and interruptions in the uses of funds for spending by households and business. A similar situation may also be occurring in Germany, where a severe recession has emerged after a prior boom: high and accelerating inflation, a tight monetary policy, high interest rates and an inverted yield curve, asset deflation, deteriorated balance sheets, and disruptions of expenditures in the private sector—all characteristics of a crunch process.

The German situation owes much to the onetime, but permanent, inflationary and recessionary shock of unification and the particular tight exchange rate relationships set by the European Monetary System (EMS). High interest rates in Germany, through the EMS grid, have spread to other European Community countries, causing economic weakness and asset deflation whether or not a given country was suffering from too much inflation. To relieve the situation in Europe, either Germany has to lower interest rates a lot, with other countries following, or countries in the EMS must drop out to freely pursue stimulative domestic policies, or, at least, realign currencies.

Credit crunch, credit slowdown, or both?

Cantor and Wenninger appear to think that this last episode was both different from and similar to other credit cycles, indicating that it played a role, but not decisively so, in the recession and unprecedented long period of weakness in the U.S. economy from 1989 to 1992, that there was no financial crisis as in other episodes, and that generally the episode broadly fits the credit cycles described in Fisher (1933), Minsky (1975), and others.

This ambiguity is confusing, since if the episode did broadly fit the pattern of other credit cycles, then the preconditions leading up to the slowdown or credit crunch (Eckstein and Sinai 1986) and events such as financial crises (Minsky 1977) should have been present. And if so, the financial factor should have been decisive in the downturn (Sinai 1992).

During 1987-90 the conditions of a crunch process appear to have been evident. There was rising inflation, strong loan demand, accumulating debt, much speculation and speculative finance, a tighter monetary policy and rising interest rates, increased financial instability and credit risk, and eventually an inverted yield curve. Subsequently, there were disappointments in expectations concerning incomes and the profits and cash flow of business, strains on financial institutions, and disappointing tax receipts at the federal, state, and local government sector levels. Asset deflation and a debt-deflation occurred. Failures, bankruptcies, and loan losses became quite pronounced, especially in the thrift and banking industries and the numerous examples cited in Cantor and Wenninger's paper. All of these are characteristic of crunch episodes. Some conditions were very pronounced, especially heavy borrowing and rising debt, increased debt service burdens, speculative finance in commercial real estate, and leveraged buyouts (LBOs). The real estate boom, wave of LBOs, surge in the stock market, and Crash of '87 represented the result of speculative bubbles and busts, all part of the financial business cycle.

The authors are right in noting the systematic and repetitive nature of the latest episode and that it resembled others on "a general level," but wrong in dismissing or downplaying the presence of any financial crisis. There are numerous examples of "financial crisis" type of events, many mentioned in the Cantor-Wenninger paper itself. These include the collapse of the thrift industry and the federal government bailout that ensued, numerous bank failures, more defaults by commercial paper issuers in 1989 and 1990 than ever before, bankruptcies of several major airlines, the greatest number of business bankruptcies since the 1930s, the stock market crash of October 1987, the collapse of the junk bond market after the financing of United Airlines failed in October 1989, and the collapse of the commercial real estate market.

The system reaction and adroit management by the Federal Reserve cushioned these events so that no cataclysmic disruption in the flow of funds occurred. But they certainly were crunch-like in nature, generically similar to other situations in crunch periods, and thus contributed, probably in a major way, to the stagnation and recession of 1989-92.

As to whether the financial factor was decisive in the downturn, how could it have been otherwise? The Federal Reserve followed an anti-inflationary monetary pol-

icy from 1986 to 1989, except for a onetime interruption after the stock market crash. Rising interest rates, declining growth in the money supply, and the slowdown in the growth of credit were signs of the monetary tightening. The burden of debt and debt service rose sharply over the period, in part from the increases in nominal interest rates engineered by the central bank. The inverted yield curve that followed was a crunch characteristic, with its significance being the financial pressure on financial institutions and corporations stemming from high-cost, short-term financing and from credit rating downgrades. Wide spreads between corporate bond rates and U.S. Treasury yields were also characteristic of a crunch, and so were the wide spreads between lesser rated and higher rated corporate securities.

In the Eckstein-Sinai (1986) terminology, this episode *was* a Crunch Period, followed by a crunch and recession in 1990-91. The generic nature of the process seems quite clear and the financial factor was quite decisive in the downturn.

Whether the credit slowdown of 1989-92 was a crunch or contained one is a question asked by Cantor and Wenninger. The terms are often used interchangeably. The credit slowdown, which the authors interpret as referring to both demand and supply, and the credit crunch (interpreted as supply-side only) do not appear distinct, so that what the authors are trying to identify and associate with past episodes becomes hard to disentangle.

Credit slowdown in Cantor and Wenninger's terminology could have been the period leading up to the crunch, a period (Crunch Period in Eckstein-Sinai) with certain measurable characteristics. Or it could have been the period and process correlated with the recession. A "crunch" is the crisis, event, or set of events that culminates the prior stage, whatever it is called, and helps precipitate the recession. The authors are vague on the dates of the "flow" concept of the credit slowdown and the "stock" notion of a credit crunch. A credit slowdown also can occur during the recession following a crunch, since credit demand normally plummets at such a time. In the paper, it is hard to tell the difference.

A credit crunch can be indicated as one phase in an endogenous process that occurs as part of a credit or financial cycle. There are many dimensions to the credit cycle process, described by Fisher (1933) as debt-deflation, Minsky (1975) (1977) as systemic financial fragility, or Sinai (1976) (1992) and Eckstein-Sinai (1986) as a Crunch Period.

The data in the tables and charts depicting the credit slowdown appear to be largely an effect of the 1990-91 recession and weak 1991-92 recovery, not a crunch, with the crunch occurring in late 1989 and early 1990, and a Crunch Period, defined by Eckstein-Sinai (1986) as the time period and processes leading up to a crunch and recession, occurring from 1987 to 1989.

The slowdown in credit growth and the decline in the ratio of debt to GDP were principally in 1990-91 (Tables 1 and 2, Chart 11). Profit margins at banks, measured by the prime rate less the federal funds rate, were lowest before and during the early stage of the recession and then higher late in the recession and recovery (Chart 3). Spreads between lesser rated and higher rated fixed income securities were highest in the recession (Charts 19, 20, 25). Loan losses, delinquencies, bond defaults, and credit rating downgrades were highest in 1990-91 (Charts 10, 13, 14, 15, 17, 18).

The credit cycle and the crunch

In a modern economy with complex, sophisticated, and leveraged financial systems, the availability of credit and finance in varied instruments and across different financial or quasi-financial intermediaries can serve to extend and amplify economic expansion, allowing stronger and more extended activity than otherwise would occur. Important linkages from money, credit, and finance to the real economy exist, among them the credit channel from lending institutions and other financial intermediaries; interest rates, through their effects on the cost of capital, marginal borrowing costs, and debt service; balance sheet positions, including the net worth of households and business; the financial positions and credit risk of households, businesses, and financial institutions; debt and debt service burdens; and in this last episode, the exposure of government at all levels because of large budget deficits. These linkages also operate to depress economic activity or to extend a period of weakness if interrupted or in a negative configuration for an extended time. Still to play out this time are potential financial instabilities in the international economies, present to a greater extent than at any time since the 1930s, mainly from a financially fragile Japan but probably also from Europe.

There is a generic character to credit crunches. Each episode shows different superficial characteristics, but the fundamentals remain the same. Notions of possible uniqueness or of major differences from earlier episodes probably arise from a lack of understanding or detailed study of the financial process and interactions with the real economy.

What are the dimensions, categories, or characteristics of a Crunch Period, the process leading up to and including a crunch or financial crisis and usually preceding a recession? What follows covers many of them and is more extensive than the discussion in Cantor and Wenninger's paper. The authors describe a number of characteristics of the process, but in a limited way focused on a shorter time span surrounding the crunch.

First, there is a *boom* before the financial trouble, with economic growth well above potential and growing excesses that set up for stock adjustment and cyclicality in the real economy and financial system. Some characteristics are full or near-full employment in the labor, product, and financial markets. Some examples in the 1987-89 period were the overbuilding in real estate and the accumulated real estate debt, heavy purchases of cars and houses and the associated indebtedness of households, and the debt excesses from LBOs in the corporate sector.

Second, *inflation* rises, accelerating at a rate too high for policy objectives, a situation that existed in 1986-89. Inflation does not have to be rising, just higher than the policy target. Inflation-induced spending and financial activities also tend to be operating, adding to the inflationary thrust and growing financial leverage and risk. Certainly, this was present in the late 1980s, observed by the central bank and moved against by monetary tightening.

Third, *speculation, speculative finance, and leveraged balance sheets* emerge, engendered by the expectations associated with the boom and high inflation. This also was clear in the late 1980s, especially in the stock market (1987), certainly in the real estate and real estate speculative boom of the mid- to late 1980s, in the wave of LBOs and junk bond issues (1987 to 1989), and in the aggressive lending and risk-taking at thrifts and banks (1986 to 1989).

Fourth, *the Federal Reserve* has a pivotal role. Tight money always has been a key characteristic of the Crunch Period and crunch (Sinai 1976, pp. 255-56). This was the case from 1986 to early 1989, whether measured by interest rates or by the monetary aggregates. The Federal Reserve was mainly targeting a reduction in inflation. The real economy weakened in the process. Cantor and Wenninger do not deal with the role of the Federal Reserve in the credit slowdown and do not discuss it in their account of the ten-stage credit cycle and crunch scenario. How can any descriptive or analytical credit cycle framework omit the central bank?

Fifth, *expectations disappointments* occur in relation to profits and cash flow, incomes, jobs, and tax government receipts, often stemming from the effects of tighter monetary policy. These disappointments magnify the negative feedback from the prior excesses that have built up.

Sixth, *increasing financial risk and financial instability occur by sector.* Households, business, financial institutions, and sometimes the government show worsening financial positions, evidenced by deteriorating financial measures such as rising debt ratios and heavier burdens of debt service relative to income or cash flow. Such developments can be all right if the asset value of collateral holds up, but are not so when there is an asset deflation.

Seventh, *balance sheets deteriorate*, with declines in net worth and worsening financial positions for households and businesses. Balance sheet shock probably was one of the main sources of trouble for the economy in the late 1980s.

Eighth, *rising credit risk occurs and lender restraints come into play* through the financial intermediary system or from markets becoming cautious. For example, more caution in the commercial paper market may exacerbate an economic downturn, further slow the economy, disappoint expectations regarding cash flows and incomes, and worsen balance sheets.

Ninth, *asset deflation* is present in the equity and fixed income markets but can also set in for real assets, eroding the asset value of collateral and making a bad situation worse.

Tenth, *market reactions* play a role. Financial and real asset markets react to the Crunch Period process, first the approaching crunch and then, when it comes, the actual crunch—a reaction that can be seen in interest rates, stock prices, and the exchange rate, often with distress selling intensifying price declines.

Typically, short-term interest rates are rising from Federal Reserve tightening and large credit demands. Long-term interest rates also rise with inflation fears, heavy financing, and possibly distress sales of assets to raise cash to replenish the disappointing cash flows, income, and profit flows. Yield spreads between risky and safer assets widen. Declines in stock and bond prices worsen balance sheets, particularly the value of net worth, limiting spending and hurting economic activity further. Finally, real asset prices generally also decline.

Eleventh, *financial institution problems* arise. Losses of deposits through various sources of disintermediation limits lending. This is usually where the focal point of the crunch lies. Loan losses and credit risk cause a retrenchment by banks and other financial intermediaries, which adds to the economic decline. Banks always have a special role in this stage and, through the credit channel, worsen economic activity.

Twelfth, *failures, bankruptcies, and rating downgrades* appear and can become pervasive, in turn feeding back to limit spending and lending because of increased credit risk.

Thirteenth, there may be an *international dimension.* If economies are weak and enough trade in goods, services, and in real and financial assets is going on, a ripple effect to the external sector can emanate as well.

This scenario has some overlap with Cantor and Wenninger's scenario and covers many of the generic characteristics of the process leading up to a crunch.

Credit growth tends to rise in the earlier stages of the process, with heavy financing occurring in order to maintain prior spending and speculative activity and to cover debt service and even asset deflation. There is a credit slowdown near the crunch and after the crunch into the recession.

Some specific comments

There are a few specific points, questions, and comments to be made on Cantor and Wenninger's paper.

In the paper, it is not clear that the analysis of the credit slowdown is an analysis of a crunch or crunch process. The many and varied dimensions of the crunch or crunch process are really not highlighted.

Worth repeating is that the role and actions of the Federal Reserve are notably absent from the authors' scenario of the credit slowdown—a serious omission, especially given the relation of central bank policy to bank liquidity and other channels that affect real economic activity and, in turn, credit demand. Described in detail is the regulatory side of the central bank—important in this particular episode, but a minor element in a picture that contains all the dimensions of a crunch process.

When a more general view is taken of the credit crunch process, the set of forces that gave rise to the slowdown in credit is probably not very different from those generating other crunch episodes. In post-World War II history, these have evolved over fairly long periods of time (Sinai 1976, Eckstein-Sinai 1986).

The information on the trends and sources of credit by depository, nondepository bank, and thrift categories is very useful, especially the attention and detail paid to the role of bank and bank lending. The providers of credit are changing quite significantly. Indeed, there is now more direct access to market financing than ever before, with intermediaries bypassed more and more frequently. Securitized lending, a relatively new development, is a major reason.

The authors mention that "some elements of speculation were present in the corporate, equity, and real estate markets." This surely is an understatement, given the Crash of '87, real estate depression, the LBO and junk bond waves of boom and bust, and the sizable asset deflation that occurred.

There may not have been a single precipitating failure or bankruptcy, as the authors note. But here, too, the role of failures and bankruptcies as an effect and cause of the *credit* slowdown is too much underemphasized. The thrift crisis, loan downsizing and consolidation, bank losses at depository institutions and insurance companies, and corporate and personal bankruptcies were the most serious and numerous since the 1930s. These failures, bankruptcies, and downsizings not only underscore the generic nature of the process, but also highlight its severity. Disintermediation was not present in the traditional way—that is, market imperfections that limit deposit rates and permit the cost of funds to rise without limit were not a factor in this episode—but perhaps disintermediation was present for other reasons—Federal Reserve stringency on reserves, leakages from M2 and M3 into other financial assets, and of course the thrift crisis, which caused a huge outflow of thrift deposits and limits on lending. Cantor and Wenninger could have looked more at deposit flows and the data on them in order to investigate this point.

The authors stress high inflation expectations as a source of the excesses that, in turn, led to adjustments. I am not sure that Chart 1, which shows actual ex post real interest rates, supports this point. The chart implies that inflation expectations are extrapolative rather than rational or model-consistent. Rational or model-driven expectations on inflation may be significant in the real rates. At least, observation of how financial market participants form inflation expectation suggests this. The chart begs this question.

Yield spreads as a systematic part of a crunch have always been noticeable. Cantor and Wenninger point to high positive spreads between loan rates and costs, but the crunch years identified in Table 4 usually have low or negative spreads as a result of inverted yield curves, which did occur in this episode.

The 1987 stock market crash was perhaps part of the crunch process—an overvalued asset market, collateral for some, and a factor in the financial positions of households. Then there was the 1989 mini-crash in the market, also part of the asset deflation process. Deflation in real estate prices began as early as 1989. These appear to be the first step in a long period of asset deflation that was an integral part of the process in this episode, but the authors do not really analyze it in this manner.

Conclusion

Cantor and Wenninger's paper is a valuable addition to the chronicles of specific episodes of credit restraint and credit crunches in the U.S. economy and financial markets. It provides much useful information, data, and insights on the credit slowdown of 1989-91. It does little, however, to increase understanding of the generic and systematic nature of the credit cycle and credit crunch process that characterizes the American business cycle.

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Not A Blown Fuse

*by Albert M. Wojnilower**

The paper by Cantor and Wenninger, and indeed the very theme and place of this conference, are welcome signs that the Federal Reserve Bank of New York tradition thrives and is regaining confidence and respect. It is a tradition that has steadfastly held that credit and financial markets matter, and matter a great deal, whether or not that view happens to be in academic favor. Yes, there is a credit cycle such as they sketch, although they are guilty of an important omission to which I will call attention later. The credit cycle replicates itself because in matters financial human beings irrationally but predictably repeat, albeit never quite exactly, the errors of judgment about which we read in our history books. In our decision making, recent and salient experience tends to crowd out the past, and disproportionately so among the gambling spirits attracted to the financial markets. But we should be grateful for that forgetfulness, because probably few if any great enterprises or industries would exist today if in the critical early stages they had been held to truly hardnosed credit standards, not to speak of today's austere criteria.

Notwithstanding the title of today's colloquium ("The Role of the Credit Slowdown in the Recent Recession"), nor the generosity of Cantor and Wenninger in citing my 1980 Brookings paper on the cyclical role of credit crunches—which has attracted more notice in the 1990s than it did in the 1980s—the current credit problem is not primarily cyclical. Although I was among the first to call attention to the post-1988 regulatory credit strangulation and to point out its parallels with the 1930s, I also emphasized from the start that there has been no credit crunch in the generally accepted sense of a widespread, sudden, sharp, indiscriminate, and rather brief credit shutdown. Unlike some earlier occasions, the credit lights did not go out because an overload blew an easily replaced fuse. Rather the lights have dimmed because of an insufficient supply of current due to serious and progressive damage to the generator. Like the examiner-enforced credit liquidations of the 1930s, the present credit squeeze did not figure prominently in triggering the business downturn, but it is insidiously sapping the vigor of the ensuing recovery. I can empathize with the sense of relief my friends at the Federal Reserve must be feeling now that the intensity of the "crunch" they helped to make has peaked and economic recovery is well established. But it would be a serious error, I believe, to declare the problem ended along with the recession, and to regard today's discussion as a mere post mortem on a closed episode in history.

Pretend we were observers from a distant planet who only bothered to look at the earth every five years or so. In 1988, we recorded that the earth's *leading* economic powers stipulated at Basle that henceforth their then most important financial institutions, the commercial banks, would be authorized to lend boundlessly to those governments, but would have to back with sizable capital any loans to the private sector. What changes in the relative size of the government and private sectors would we expect to observe on subsequent flybys?

In 1993, we would note that, at least in the United States, substantial additional restrictions on risk-taking had been and were being placed on banks. These include tough capital constraints on the extent to which short-term deposits can be used to acquire longer term assets (such as more-than-three-year government securities), as well as many new restrictions on the acquisition of other-than-prime assets. We would also note steps to limit the scope of, and increase the charges for, deposit insurance. Meanwhile, public access to fully guaranteed government-issued deposit substitutes such as U.S. Treasury securities (or, in

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Japan, postal savings accounts) is facilitated and promoted. The public also has more reason to expect that the value of deposit substitutes such as money market funds will be protected and that governments will intervene strongly against major stock price declines.

The extraterrestrial observer must conclude that government obligations and/or private instruments free-riding on implicit government guarantees will expand at the expense of the traditional deposits. Issuers of deposit liabilities—banks, that is—will shrivel. Since banks are also important lenders, clearly there is need, incentive, and opportunity for new mechanisms to assume the lending role that banks are being forced to vacate. At least in the transition, problems are faced by those borrowers, especially small, young, or novel enterprises, for which an alternative and cheap credit source is not readily at hand. Relief of these problems is vital to the survival of an enterprise economy in the United States.

The financial institutions being phased out, the observer would also note, happen to be those most intimately connected with the earth's payments systems. These payments systems, the observer would be aware, are among the greatest of human inventions, hugely broadening the extent of the market and the division of labor. Important as was the invention of money in the form of coin and, later, currency, their substantial replacement by transferable deposits has provided even more dramatic benefits. When we receive a check we do not need to concern ourselves with the identity of the bank on which it is drawn. The smooth operation of this system, which although relatively recent is by now taken for granted, is the province of banks under the supervision and with the help of central banks.

Owing to the decline of the banks, the organization of the payments system, too, will have to change. Perhaps the checking account function could all be handled by and through the Federal Reserve, much as in some countries (and to an extent here in the United States) it used to be done through the post office. Alternatively, we might create special "banks," obliged to keep 100 percent reserves, solely for this purpose. The public would pay them for operating a state-of-the-art safe deposit, message, and bookkeeping system. Or, as Litan has suggested, we could establish so-called narrow banks allowed to invest, but only in safe (mostly government-backed) assets. The interest earnings would reduce or eliminate explicit charges to the checking account customers. In fact, sterilizing banks in this manner seems to be the conscious or subconscious intent of the current regulatory thrust. But among undesirable side effects would be the enlargement of the government's already preferential credit access and the creation of a dangerous potential for huge disruptive shifts out of uninsured into insured deposits and deposit substitutes whenever whispers of credit weakness were heard.

Continuing along this spectrum of payments system possibilities, we would come next to the banking structure that we now have but that, as already indicated, is unlikely to survive. Moving along further, one might visualize payments systems operated by financial institutions newly formed to evade the official restrictions that are driving banks out of the business, or by industrial firms that do not have to answer to the monetary authority at all.

Indeed, some earthlings appear to believe that securities can take the place of deposits in the payments system. "Sorry, honey," purrs your supermarket checker, "but you can't take these groceries because, according to this computer, your mutual fund just dropped 1 percent, and your account is overdrawn." In such a world, political realities would eventually make it the government's job to stabilize a broad range of government security and other asset prices. Actually, it is mainly the governmental backing of the instruments, most issuers, and when necessary the primary dealers that has made possible the principal form of securitization, that of mortgages. More dramatically, would the New York Stock Exchange be alive today if the Crash of 1987 had gone unheeded and unmitigated by the Federal Reserve Bank of New York and much higher authorities? Suppose, further, that every balance sheet had been marked to market that night and that in the morning all the auditors and examiners had followed to the letter the rules to which they were sworn? It is the many such instances of ad hoc governmental intervention and forbearance, not any articulated policy, that explain why Cantor and Wenninger's missing credit crisis hasn't happened.

To this earthbound observer, the most likely path of least resistance in filling the banking vacuum, in both its lending and payments dimensions, is for these functions to be assumed by major nonfinancial enterprises operating through captive finance companies in conjunction with (possibly also captive) money market funds. The money market funds hold the paper of the finance companies and/or their parents. Whatever the merits or drawbacks of such an arrangement, it would have in common with the existing banking system that a risk-taking lending institution was financing itself, directly or at short remove, with liabilities that are regarded by their owners, as well as by Federal Reserve statisticians, as part of the stock of money. In principle the difficulties in providing implicit or explicit insurance for the liabilities, modulating their quantity and quality, and ensuring the integrity of the payments

mechanism would remain the same. But in practical terms, they would be far more daunting because of the likely industrial, employment, and political linkages, international as well as domestic, of the giant companies involved. We may be sure from current and past examples that such companies would be prone to the same frailties, including abuse of power, as their financial precursors. "Too big to fail" would take on an even more literal and much larger meaning.

The consequences of the direction we take extend far beyond the financial sector. Critical changes in the financial machinery can affect the chief dimensions of society. Alternative outcomes with respect to the split between the governmental and private credit machinery, the extent of bias in favor of large or established borrowers, and the lodging of economic control will have profound repercussions. A universal banking system of the German stereotype, in which large banks hold influential equity positions in industry, produces a very different power structure from the Japanese stereotype, in which the large industrial empires dominate the banks. Either path would diverge sharply from American tradition, which is highly suspicious of concentrations of power in both finance and industry and anxious to preserve regional and even local autonomy.

Historically, our payments, deposit, and credit systems have been joined together in banks. The revenue from credit has paid for the deposits and the checking account operations. But competition for assets from securitization, and for deposits from de jure and de facto government-guaranteed instruments such as Treasury bills and money market funds, has reduced the revenues. Now, on top of this, the new regulatory capital and other constraints, by eroding traditional earning opportunities in lending and maturity transformation, are taking a further big bite. No wonder so many banks are exiting the banking business, both voluntarily and involuntarily. (Tables 1 and 2 present some further pertinent data.)

My views on these matters are clear; I do not pretend to be impartial. Both the payments and the credit systems have been and should continue to be regarded and treated as public utilities. Banks should not be required, encouraged, or even allowed to withdraw from lending and maturity transformation, any more than an electric utility would be permitted to withdraw service from part or all of its territory. For banks as for other utilities, we should limit competitive access, ensure adequate but capped returns, and restrict ventures in unrelated fields. Of course the specific rules, like any living institution, must change and adapt. The "credit crunch" that is the subject of this meeting has important cyclical and monetary ramifications, but it is fundamentally and most importantly a complex problem in public utility regulation.

Let me add one more quotation from the 1980 paper

Table 1
Depository Institutions' Managed Liabilities
Annual Average Percent Change

1960-64	11.6
1965-69	8.9
1970-74	13.5
1975-79	11.9
1980-84	10.0
1985	8.4
1986	6.7
1987	5.6
1988	6.8
1989	4.1
1990	−0.1
1991	−1.9
1992	−4.5

Source: Board of Governors of the Federal Reserve System, H.6 statistical releases (Money Stock, Liquid Assets, and Debt Measures).

Notes: Liabilities include overnight and term repurchase agreements and Eurodollars, savings and money market deposits, and small and large time deposits. Entries in table are based on annual averages of monthly data. For January-February 1993, preliminary data show a decline of 3.1 percent from the 1992 average, 5.2 percent from January-February 1992, and 8.4 percent (at an annual rate) from the fourth quarter of 1992.

Table 2
Growth of Private Sector Credit by U.S.-chartered Commercial Banks and by Foreign Banking Offices in the United States
Percent Increase to Year-End

	Domestic Banks	Foreign Banks
1983	9	0
1984	13	12
1985	11	26
1986	11	31
1987	7	20
1988	8	19
1989	8	13
1990	3	15
1991	−2	21
1992	1	7

Sources: Board of Governors of the Federal Reserve System, Flow of Funds Accounts and G.7 statistical releases (Loans and Securities).

Notes: The above data include small amounts of loans to foreigners. In December 1992, business loans to non-U.S. addressees plus loans to foreign banks amounted to only 4.3 percent of their total loans of $274 billion. The corresponding figure for domestic banks was 0.3 percent of $1,384 billion.

cited by Cantor and Wenninger. I asserted that following each crunch, "the authorities ... and the private markets ... have deliberately reshaped the financial structure so as to prevent the recurrence of that particular form of credit supply interruption." In the current context, I would put that a bit differently. Whenever the world embarrasses the authorities, they try to reshape the world in a fashion that, they believe, will make it impossible for them to be embarrassed that way again.

Whatever the many justifications, good and bad, for the abolition of the Regulation Q interest rate ceilings, the dominant impetus came from the determination of the authorities to prevent the recurrence of disintermediation-provoked credit crunches. To dismantle the ceilings, without serious plans to deal with the inevitable bloodbath in the overpopulated financial zoo, was an act of recklessness. As a matter of sheer survival, most financial institutions urgently had to expand their credit volume to make up for shrunken profit margins. That response is what caused the overexpansion of credit and subsequent failures. Now, surprised and embarrassed by these failures (how could the exalted free market make such huge mistakes?), the authorities have reacted by making it difficult, perhaps impossible, for the firms under their sway to assume the risks necessary to remain profitable as financial intermediaries in the long run.

This returns me to the critique I promised at the outset. For all their cordial review of Minsky's thought, still missing from Cantor and Wenninger's ten-step credit cycle chronology is any admission that organizational, technological, and regulatory change in finance can and does move the world. All that the authors grant to credit is a reactive role, one that may amplify but cannot initiate change beyond the financial sector.

That attitude lets the authorities off the hook. Their obligation remains only to follow the correct rulebook on monetary aggregates and the federal funds rate. But the fact that most Fed economists do not wish to be public utility regulators—because that confers little academic prestige?— does not excuse the institution from its responsibility.

Recently a football star was paralyzed by an injury sustained on the field of play. The whole country is surprised and delighted to see him regaining the use of his limbs. But he will never play ball again. The same for the damage done by the so-called credit crunch. Although the banks are walking again, the long-range consequences are beginning, not ending.

Credit in the Macroeconomy

*by Ben S. Bernanke**

I. Introduction

Issues of credit extension and credit quality, though largely ignored by the conventional macroeconomic paradigm, seem nevertheless to have become important elements of contemporary macroeconomic analysis. A leading example is the reaction of many economists, policymakers, and journalists to the recent recession in the United States: rightly or wrongly, the conventional wisdom has pointed to factors such as the "credit crunch" and the "overleverage" of households and firms as major contributors to the U.S. economic slowdown and the erratic nature of the subsequent recovery. Similarly, recent economic downturns in the United Kingdom, Japan, and other countries have been attributed by some observers (the *Economist* magazine, for example) to problems in the banking sector or weakness of corporate balance sheets.

Are these credit-related aspects of recession and recovery a new issue, a phenomenon peculiar to the late 1980s and early 1990s? Evidently this is not the case. No recent experience of credit problems, financial distress, or insolvency rivals the experience of the Great Depression, for example. And in the postwar period, episodes such as the 1966 credit crunch and the 1980 experiment with selective credit controls highlighted possible links between credit and the macroeconomy. Rather than credit having somehow newly emerged as a factor in business cycles, what has happened recently is that there has been a confluence of economic events and developments internal to the field of economics. In particular, as I will outline briefly in Section II, over the last two decades or so new theoretical insights about the economic implications of imperfect information have led economists to look at credit markets with a fresh interest and a fresh perspective. This fortuitous conjunction of events and ideas has contributed to an enhanced appreciation of the role of credit in the macroeconomy by most economists and policymakers.[1]

The purpose of this paper is to review and interpret some recent developments in our understanding of the macroeconomic role of credit or, more accurately, of the credit creation process. By *credit creation process* I mean the process by which, in exchange for paper claims, the savings of specific individuals or firms are made available for the use of other individuals or firms (for example, to make capital investments or simply to consume).[2] In my broad conception of the credit creation process I include

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[1]It is worth emphasizing that the "rediscovery" of credit is just that; there have always been some economists who have emphasized credit's macroeconomic role and importance, certainly including Irving Fisher and possibly Keynes. Important references include Fisher (1933), Gurley and Shaw (1955, 1960), Kindleberger (1973, 1978), Minsky (1964, 1975), and Wojnilowner (1980). Gertler (1988) provides an excellent review of the evolution of thought on this topic. Note that the DRI econometric model of the U.S. economy has long given a central role to "credit crunches" and other financial factors (Eckstein and Sinai 1986), as does the more recent Sinai-Boston model (Sinai 1992).

[2]Note that I am drawing a strong distinction between credit creation, which is the process by which saving is channeled to alternative uses, and the act of saving itself. Thus, although inadequate saving may be a major macroeconomic problem, that issue is not my concern in this paper. Because the focus of this paper is the credit creation process rather than saving per se, I devote most of my attention here to markets for private credit, where issues of credit quality are most relevant, rather than to markets for government credit. Obviously, a study of the U.S. saving problem could not afford to ignore issues relating to government borrowing and debt.

most of the value-added of the financial industry, including the information-gathering, screening, and monitoring activities required to make sound loans or investments, as well as much of the risk-sharing, maturity transformation, and liquidity provision services that attract savers and thus support the basic lending and investment functions. I also want to include in my definition of the credit creation process activities undertaken by potential borrowers to transmit information about themselves to lenders: for example, for firms, these activities include provision of data to the public, internal or external auditing, capital structure decisions, and some aspects of corporate governance. The *efficiency* of the credit creation process is reflected both in its ability to minimize the direct costs of extending credit (for example, the aggregate wage bill of the financial industry) and in the degree to which it is able to channel an economy's savings into the most productive potential uses.

The presumption of traditional macroeconomic analysis is that this credit creation process, through which funds are transferred from ultimate savers to borrowers, works reasonably smoothly and therefore can usually be ignored. In the standard IS-LM model of the intermediate macroeconomics textbook, for example, firms' willingness to invest is determined only by the physical productivity of capital and the real interest rate, which in turn depends on households' desire to save and wealth holders' liquidity preference. In the standard model, factors such as the financial condition of banks and firms play no role in affecting investment or other types of spending.

An alternative to this conventional view holds that the credit creation process, far from being a perfectly functioning machine, may sometimes work poorly and even break down. Furthermore, according to this alternative perspective, fluctuations in the quality of credit creation have implications for aggregate variables such as output, employment, and investment.[3] It is this alternative view, as interpreted through the lens of the economics of imperfect information, that is the subject of my paper.

The rest of this paper is structured as follows: Section II is a brief introduction to recent research on credit markets based on the new economics of imperfect information. It focuses on two aspects of credit creation that have received extensive attention from economists, namely, the roles of financial intermediaries and of borrowers' balance sheets in solving information and incentive problems in credit markets.

With Section II as general background, Section III reviews the debate on the role of credit in the transmission of monetary policy. Because this research area is currently quite active (and because this meeting is taking place at a Federal Reserve Bank), I devote a good bit of space to this issue. However, the macroeconomic role of credit is certainly not limited to its role in monetary transmission: Section IV looks briefly at other ways in which credit factors are important for business cycles and macroeconomic policy, including the "credit crunch" and "overleverage" phenomena. In Section V I offer an interpretation of the role of credit in the recent U.S. recession. Section VI concludes by asking how the fundamental and ongoing changes in the U.S. financial system are likely to affect the role of credit in the macroeconomy.

[3]In this paper I consider only the implications for business cycles and macroeconomic policy of variations in the quality of credit creation. It should be mentioned, however, that issues of financial performance have recently assumed a major role in economists' thinking about longer term issues, including economic growth and development and the transition from communist to capitalist systems.

II. The new economics of imperfect information: Implications for credit market analysis

To a degree that may be unfortunate but is probably unavoidable, the topics that economic researchers investigate and the interpretations at which they arrive are affected as much by the internal dynamics of the field—the development over time of new economic theories and methods—as by the external reality of economic events and institutions. The effects of the internal dynamic are quite clear in the evolution of economists' views about the role of credit markets. In this section I will briefly review the recent and rather dramatic changes in economists' ideas about credit markets and lay out a few basic themes that will recur throughout this paper. In doing so, I will cite very selectively; a comprehensive survey of this burgeoning field would require a much longer paper than this one.

Twenty years ago the dominant economic paradigm was one that assumed "complete markets," that is, perfect information. Economic theorists used the complete-markets setup to prove powerful, formal theorems about the efficiency of a decentralized market system, thus making rigorous and precise Adam Smith's "invisible hand" idea of two centuries earlier. Techniques were also developed to use the complete-markets approach to study a variety of applied economic issues, from the pricing of financial assets to the incidence of tax policies. The complete-markets paradigm remains influential in macroeconomics today in the form of the so-called real business cycle approach to dynamic macroeconomic modeling.

The essence of the credit creation process is the gathering and transmission of information. Hence it is perhaps not surprising that economic theorists, once habituated to the assumptions of complete markets and perfect information, began to downplay the role in the economy of credit creation and of the financial system more generally. An early example of this tendency was

a tremendously influential paper by Franco Modigliani and Merton Miller (1958). Modigliani and Miller showed that under the assumption of complete markets (and ignoring some complicating factors such as tax effects), firms' capital structures (their chosen mix of debt and equity finance) are economically irrelevant. Their basic point was that in competitive markets with perfect information, real economic decisions (what to produce, how to produce it) depend only on consumer tastes and available technologies and inputs, not on how the ownership claims to the firm happen to be labeled. In other words, the size of the pie is not affected by how you slice it.

In another complete-markets theoretical analysis, Fama (1980) extended the Modigliani-Miller point to the entire financial system (he focused particularly on banks). Fama argued that whether the public chooses to hold, say, bank deposits or common stocks affects only the labeling of ownership claims and is irrelevant to real macroeconomic outcomes, which depend only on tastes, technology, and resources. In short, the financial system is a "veil." One striking implication of this view—an implication that is quite counter to both the conventional wisdom and the approach to credit markets I will discuss below—is that massive bank runs would have no real effects on the economy. In Fama's model, the deposit withdrawals associated with bank runs are only a portfolio shift by the public and have no more real economic significance than would a shift of investors' funds from one mutual fund to another.

While the complete-markets approach remains important in economics, during the 1970s that paradigm's assumption of perfect information came under increasing criticism, and a new economics of imperfect information began to flower. In a seminal theoretical article, George Akerlof (1970) argued that allowing for imperfect information could overturn the central implication of the complete-markets model, that competitive, decentralized markets yield economically efficient results. Akerlof used as his example the market for used cars. In the used car market, the typical situation is one in which the seller (the used car owner) knows more about the good being sold (that is, whether it is a "lemon") than does the potential buyer. Akerlof argued that in this type of market, in which information is "asymmetric" between suppliers and demanders, lowering prices may not increase demand for the good in the usual way. The reason for this result is that potential used car buyers may realize that the lower the prevailing price, the more likely it is that only owners of "lemons" will choose to offer their cars for sale. Hence, lower prevailing prices may not make people more eager to buy a car. Since demand may not increase as price falls, it is possible that there is *no* price that equates supply and demand, and the market for used cars could break down completely.

According to Akerlof's analysis, making the used car market work efficiently will generally require mechanisms for overcoming the information problem. Examples of such mechanisms are bonds or warranties offered by the seller, third-party mechanics who inspect used cars for a fee, or used car dealers who develop good reputations with the public. Analogous results in other contexts were found by Rothschild and Stiglitz (1976) in their theoretical analysis of insurance markets and by Jaffee and Russell (1976) in their analysis of the economics of bank lending.

The veritable explosion of research on the economics of imperfect information that began in the 1970s led to a parallel awakening of economists' interest in the information-gathering functions of the financial system. A major benefit of the new research was that economists gained a much deeper understanding of the fundamental difference (ignored by the complete-markets approach) between the credit market and a market like the wheat market. Wheat is a standardized commodity whose quality is easy to evaluate; thus the wheat market can operate in a decentralized, arm's-length fashion, in which suppliers and demanders need only know the prevailing price in order to decide how much to sell or buy. In contrast, the market for credit is suffused with imperfect and asymmetric information. So, in the credit market—as in Akerlof's used-car market—decentralized, arm's-length transactions based only on price (or the interest rate, in this case) are unlikely to work.[4] Instead, in order to clear the credit market, "price" (that is, the interest rate or expected yield) may have to be supplemented by a variety of other institutional mechanisms to overcome the problems of imperfect information.

What are the mechanisms that allow the credit market to function despite imperfect and asymmetric information? The research of the last fifteen or twenty years has focused on two: 1) the existence of banks or other financial intermediaries and 2) the structure of financial contracts.

A. The special nature of banks and other intermediaries

In the market for used cars, the problems of asymmetric information may be overcome if there are independent mechanics who specialize in evaluating used cars for a fee. Or there may be used car dealers who provide warranties or who have incentives (because of repeat business) to develop a reputation for honest dealing.

[4]The analogy between Akerlof's used-car market and credit markets is drawn explicitly for the loan market by Stiglitz and Weiss (1981) and for the equity market by Myers and Majluf (1984).

Analogously, in credit markets, there is potentially an important role for various intermediaries (including banks, pension funds, life insurance companies, brokerage houses, and many other institutions) that specialize in gathering information, evaluating projects and borrowers, and monitoring borrowers' performance after the loan. Many economists have suggested that banks and similar institutions play a particularly central role in credit markets because of their expertise in conveying the savings of relatively uninformed depositors to uses (such as small business loans) that are information-intensive and particularly hard to evaluate. In short, according to this view, banks are "special."

A large theoretical literature has focused on why banking institutions are able to create credit more efficiently than either individual savers or some alternative types of institutions.[5] Among factors that have been cited are economies of specialization (lending officers can gain expertise in a particular industry, for example), economies of scale (it is cheaper for a bank to evaluate a loan than for many small savers to do so independently), and economies of scope (it is efficient to provide lending services in conjunction with other financial services).

Empirically, there is a good bit of direct and indirect evidence that banks and similar intermediaries play a special role in the process of credit creation. For example, Fama (1985) and James (1987) showed that bank borrowers rather than depositors typically bear the "tax" associated with reserve requirements. Since borrowers would not willingly bear this tax if they had good alternatives, this finding suggests that bank borrowers receive access to credit or other lending services that they could not costlessly duplicate on open capital markets.

Several studies have emphasized the importance of bank lending relationships for small and fledgling businesses and the reliance of small businesses on banks located geographically close to them (Elliehausen and Wolken 1990; Petersen and Rajan 1992). Larger firms apparently also benefit from the special services that can be provided by banks; for example, James (1987) and Lummer and McConnell (1989) find that the announcement of bank loan agreements, which presumably indicate the approval of bank lending officers of the company's business plans, raises the price of the company's shares. Sushka, Slovin, and Polonchek (forthcoming) show that during the period in which Continental Bank was in danger of failing, the share prices of Continental's loan customers moved in concert with the price of Continental stock, rising sharply on news of the bailout; this finding suggests that for Continental's customers, a continuing relationship with their bank was important. A number of papers have also shown that banking relationships reduce the costs to firms of financial distress (see, for example, Gilson, John, and Lang 1990).

For the purposes of macroeconomic analysis, the main implication of this literature on intermediation is the following: If banks and other intermediaries perform a special role in the credit creation process, for example, by providing credit to certain classes of customers who could not easily borrow elsewhere, then—counter to the implication of the Fama (1980) model—factors that reduce the amount of credit channeled through the banking system may have significant macroeconomic effects. Depending on the particular macroeconomic framework, these effects might occur either because the spending of bank-dependent borrowers would decline or because the net return to saving in the economy would fall, or both. Possible sources of a reduction in the supply of bank credit, most of which will be discussed below, include bank runs or panics, government restrictions on bank lending (for example, credit controls), increased costs (for example, regulatory costs), declines in banks' capital or deposit base, and monetary policies that reduce the stock of bank deposits.

B. The structure of financial contracts: the critical role of borrowers' balance sheets

A second area in which the economics of imperfect information has had a major impact is the analysis of financial contracts and financial instruments. An important insight of this research is that in a credit market with imperfect or asymmetric information, the form of the financial contract between the lender and the borrower may have important effects on the borrower's incentives to truthfully reveal information and/or to make business decisions that are in the creditor's interest. Thus, far from being irrelevant as implied by Modigliani and Miller (1958), the structure of financial claims is intimately related to borrower decisions and thus to real outcomes in the economy.

A pathbreaking application of the economics of imperfect information to the study of financial contracting was provided by Jensen and Meckling (1976). These authors reconsidered Modigliani and Miller's question of optimal capital structure, but instead of assuming perfect information as had Modigliani and Miller, they considered the more realistic situation in which potential investors in a firm have only limited ability to monitor the activities of firm management. Jensen and Meckling show that with the addition of imperfect information, the

[5]Important papers include Diamond and Dybvig (1983), Diamond (1984), Boyd and Prescott (1986), Allen (1990), and Calomiris and Kahn (1991).

Modigliani-Miller irrelevance result disappears: the actions of management (and hence, the real outcomes in the economy) are no longer independent of how the firm is financed.

A simple example will clarify the Jensen-Meckling argument. Suppose that the "insiders" (managers, directors, principal shareholders) who run a particular firm have only enough wealth themselves to own 1 percent of the firm's assets. The other 99 percent of the firm's assets must be financed (we assume) by straight debt or equity issued to the public. Jensen and Meckling showed that either financing choice inevitably entails some distortion of the insiders' incentives. Suppose, for example, that the other 99 percent of the firm is financed by an equity issue. Then, assuming that outside shareholders cannot effectively monitor the insiders' actions, the insiders will have little incentive to work hard to increase the firm's profits, since they personally receive only 1 percent of any extra profits earned. Thus, with equity finance, profits will be lower than they should be.

Reliance on debt finance instead of equity would ameliorate this particular incentive problem since with 99 percent debt finance, the insiders (as the sole equity holders) would be entitled to any extra profits they could create. However, in the Jensen-Meckling framework, debt finance turns out to create a different incentive problem: with high leverage, and assuming that direct penalties for bankruptcy are not too high, insiders have an incentive to take excessively risky actions or make excessively risky investments. The reason for this risky behavior is that with high levels of debt finance, the insiders retain most of the profits from success while the debt holders absorb most of the losses from failure.[6]

The difference between what the value of a firm would be under perfect information (with insiders acting so as to maximize total profit) and what it is under a particular financing arrangement is called the *agency cost* of that financing arrangement (the term is from a branch of economic theory called principal-agent theory). Jensen and Meckling demonstrated that both external equity finance and external debt finance have agency costs that inevitably arise from the combination of imperfect information and the separation of ownership and control. They suggested that, in practice, we should observe firms choosing capital structures that are optimal in the sense of minimizing total agency costs.

Jensen and Meckling's original framework was quite simplistic; for example, it did not allow for alternatives to straight debt and equity (such as convertible debt or preferred stock) and did not consider the implications of the fact that outside equity holders have voting rights. A voluminous theoretical literature has now corrected these omissions and tackled many other difficult questions without reversing Jensen and Meckling's basic points.[7] For our purposes, one of their insights is particularly important—the insight that because of information and incentive problems, external finance (funds raised from outsiders) is intrinsically more expensive to the firm than internal finance (the firm's retained profits or funds controlled by insiders).[8] Hence, of two firms with identical opportunities to make a capital investment but different levels of internal finance, the firm with the greater availability of internal finance should always be more willing to make the investment.

Another way to put this point is that *balance sheet positions matter.* All else equal, a firm with a high net worth and plenty of liquid assets available will be much more likely to undertake a capital investment, expand its business, or hire new workers than a firm with a weak balance sheet that must rely on external finance.

The empirical evidence for the view that internal finance is cheaper than external finance, and therefore that balance sheets matter, is quite strong. In an influential paper, Fazzari, Hubbard, and Petersen (1988) compared the investment behavior of rapidly growing, non-dividend-paying firms with that of more mature, dividend-paying firms. Since presumably the rapidly growing firms were relatively more constrained in terms of the availability of internal finance, the theory implies that their investment spending should have been more sensitive to their current cash flows than was the investment spending of the more mature, liquid firms. Using capital valuations derived from share prices to control for the quality of investment opportunities, Fazzari et al. confirmed this implication in the data. Many subsequent studies have found that firms' liquidity or balance sheet positions affect their willingness to make capital investments, and that firms find internal finance to be cheaper than external finance (see, for example, Fazzari and Athey 1987; Whited 1991, forthcoming; Calomiris and Hubbard 1991; and Hubbard and Kashyap, forthcoming).

An interesting interaction between the special role of banks and the importance of firms' balance sheet positions for investment was found by Hoshi, Kashyap, and Scharfstein (1991) in a study of Japanese firms. In Japan, many firms are affiliated with *keiretsu*, or indus-

[6]This is perhaps not a bad description of the situation of the savings and loans industry in the 1980s.

[7]See, for example, Myers (1984), Narayanan (1988), Lacker, Levy, and Weinberg (1990), and Bayless and Chaplinsky (1991).

[8]While we have emphasized the agency costs of external finance, there are also a variety of more prosaic transactions costs (for example, legal and accounting costs) that are higher for external than for internal finance.

trial groups. Firms within a particular *keiretsu* typically enjoy a close relationship with the industrial group's "main bank," a relationship that helps to overcome information problems and thus reduces the costs to the firm of external finance. The prediction of the theory is that investment spending by firms within a *keiretsu*, when compared with spending by non-keiretsu firms, would be relatively independent of changes in internal cash flow and liquidity because of these firms' easier access to external funds. Hoshi et al. confirmed that this prediction held for their sample.

With this introduction to some themes that the new economics of imperfect information has brought to the analysis of credit, I turn now to the main subject of the paper, the link from credit to macroeconomic policy and macroeconomic fluctuations. Section III discusses the role of credit in the transmission of monetary policy, an area that has recently received much attention. Section IV takes up some other ways in which credit affects macroeconomic performance.

III. The role of credit in the transmission of monetary policy

How does monetary policy affect aggregate demand? The conventional view, codified for example in textbook presentations of the Keynes-Hicks-Modigliani IS-LM model, is that the Federal Reserve can affect spending by changing the supply of the medium of exchange relative to the demand. According to this story, to slow down the growth of aggregate demand (for example), the Fed should use open market sales to drain reserves from the banking system, reducing the money supply. This contrived scarcity of the medium of exchange is presumed to drive up short-term interest rates and possibly—through substitution and expectational effects—longer term rates as well. In the last step of the process, higher interest rates depress aggregate demand by raising the cost of funds relative to the returns to capital (including housing and consumer durables).[9] This standard view of the monetary transmission mechanism has been referred to as the "money view."

The money view embodies some strong assumptions about credit markets, although the assumptions are not usually emphasized in textbook presentations. The most striking of these is that, effectively, the money view assumes that all nonmoney assets are perfect substitutes.[10] Thus, while wealth holders are sensitive to the mix of money and nonmoney assets in their portfolios, they are indifferent among nonmoney assets (which include government bills and bonds, commercial paper, corporate bonds, stocks, bank loans, consumer credit, and so forth). Similarly, in this story, firms are not supposed to care about the type of liabilities that they have, or for that matter whether they are financed by internal or external funds. Thus, unlike changes in the mix of money and nonmoney assets, factors affecting the mix of credit instruments have no effect on the economy.

While the money view no doubt contains some truth, there are a number of reasons to be skeptical that this conventional channel is the sole source of the potency of monetary policy in practice: First, there is little reason, theoretical or empirical, to accept the money view's stark characterization of currency and bank deposits as the *only* assets for which there are not perfect or nearly perfect substitutes. On the one hand, we know that there are liquid assets in the economy whose supply is not controllable by the Federal Reserve, such as money market mutual funds and bond funds. The availability of money substitutes outside of banks must surely limit the leverage of the Fed to affect interest rates by reducing the supply of bank deposits, except at very short horizons.[11] On the other hand, common sense rejects the notion that all forms of private credit are the same (that is, perfectly substitutable): the types of credit instruments available to IBM and to the corner grocery store are quite different, as are the types of credit instruments held as assets by middle class individual savers and university endowment funds. (Many of these differences among credit instruments arise, of course, from the deep reasons emphasized by the economics of imperfect information.) The extreme substitutability assumptions of the money view make it a polar view; to the extent that those assumptions are violated, the channels of monetary transmission become more complex.

A second general objection to the money view is that this conventional channel seems to be too weak to account for the relatively large effects of monetary policy on spending that we sometimes observe. The theory implies that changes in the supply of money can affect *real* interest rates only over a relatively short horizon, but purchases of long-lived capital goods and housing should depend primarily on the long-term real interest rate, which is relatively immune to monetary actions.[12]

[9]Higher interest rates also strengthen the dollar, leading to reduced export demand.

[10]In the IS-LM model there are only two financial assets, money and bonds. "Bonds" is an aggregate of all nonmoney assets, which are assumed to be perfectly mutually substitutable.

[11]Brainard and Tobin (1963) pointed out that the availability of money substitutes might dampen the impact of monetary policy actions.

[12]The dependence of capital spending on the long-term real rate requires the plausible assumptions that capital investment is irreversible and that there are limits on substitutability with other factors once capital is installed.

Even more damaging to the money view, most studies find that the sensitivity to interest rates of capital spending, inventory investment, and other major categories of spending is quite low (see Hirtie and Kelleher 1990 for a recent survey and some independent estimates).

Without necessarily denying that the conventional liquidity channel plays a role in monetary policy transmission, some recent research has addressed an alternative channel that 1) allows for more general patterns of asset substitutability than the money view and 2) can help explain, together with the conventional view, the apparent potency of monetary policy actions. This alternative channel, which builds on ideas emerging from the economics of imperfect information (Section II), has been variously called the "credit view" or the "lending view."[13]

A. The "credit view" of monetary transmission

In a nutshell, the credit view asserts that in addition to affecting short-term interest rates, monetary policy affects aggregate demand by affecting the availability or terms of new bank loans. This is an old idea, going back at least to the "availability doctrine" of the 1950s (Roosa 1951; see also Brunner and Meltzer 1968). An early restatement of the idea in the language of the economics of imperfect information can be found in Blinder and Stiglitz (1983).

A spare formal treatment of the credit view was given by Bernanke and Blinder (1988). Bernanke and Blinder took the conventional IS-LM model[14] and added a single assumption: they assumed that besides the two imperfectly substitutable financial assets called "money" and "bonds" that appear in the standard model, there is a third asset called "bank loans" that is imperfectly substitutable with the other two assets. This assumption is motivated by the idea, discussed in Section II, that banks are special in their ability to extend credit to borrowers who, because of imperfect information, would find it difficult to borrow from other sources.

Adding the third asset to the standard model opens up a new channel of monetary policy transmission. Suppose again that in order to dampen aggregate demand, the Fed does an open market sale and drains bank reserves from the system. As the loss of reserves reduces the quantity of bank liabilities (deposits), it must also reduce bank assets. Assuming that banks treat the loans and securities that make up their portfolios as imperfect substitutes,[15] the loss of deposits will induce them to try to reduce both categories of assets.

If firms are completely indifferent about their source of finance, then a cutback in bank lending will not affect their spending or other behavior. However, if banks play a special role in providing credit to some borrowers, then a drying up of bank lending forces these borrowers to more expensive forms of credit (or denies them credit altogether). As a result, bank-dependent firms may cancel or delay capital projects, reduce inventories, or even cut payrolls, depressing aggregate demand. Similar effects may operate in the consumer sector to the extent that households are directly or indirectly dependent on banks for certain types of credit.

A couple of points are worth adding here: First, in many discussions the credit channel of monetary policy has been closely identified with the related idea that banks and other lenders sometimes ration credit (that is, limit the quantity of credit extended to certain borrowers or refuse to lend altogether). Credit rationing—which can be motivated as a response to imperfect information in credit markets (Stiglitz and Weiss 1981)—is certainly *consistent* with the existence of a credit channel, and it may be empirically useful in explaining the apparent "stickiness" of published loan rates. However, credit rationing is not at all *necessary* for the credit channel to exist. All that is required for a credit channel is that bank credit and other forms of credit be imperfect substitutes for borrowers. Thus the fact that many bank borrowers have potential alternative credit sources (such as finance companies) does not eliminate the credit channel, as long as the alternative credit sources are to some extent more expensive or less convenient to the borrower.

Second, while the Bernanke-Blinder treatment emphasizes the bank lending channel, credit factors may enhance the effects of monetary policy on the economy in other ways. In particular, as the discussion of Section II suggests, to the extent that monetary policy affects balance sheet positions, there will be a sort of credit channel that impacts even firms that are not dependent on bank loans.[16] For example, a mone-

[13]For additional discussion of the credit view, see Kashyap and Stein (1992) and Gertler and Gilchrist (1992).

[14]Although Bernanke and Blinder work in the Keynesian IS-LM framework, the credit view is compatible with non-Keynesian approaches; see, for example, Fuerst (1992) and Christianno and Eichenbaum (1992).

[15]The assumption that loans and open market securities are imperfectly substitutable as assets from the bank's point of view is different from the assumption that loans and securities are imperfect substitutes from the point of view of borrowers. However, the former assumption is also realistic: banks hold securities such as Treasury bills primarily for liquidity, to be used as collateral, and to satisfy various legal requirements, while loans are held primarily for their expected return.

[16]This point has been emphasized by Gertler and Gilchrist (1992).

tary policy easing that lowers open market interest rates is likely to increase firm asset values and improve liquidity by lowering interest-to-cash-flow ratios (assuming either floating rate or callable corporate debt). If these balance sheet improvements raise the availability of internal funds and improve the terms on which firms can attract external funds, they are likely to result in increased spending. Note that although this effect (if it exists) works through open market interest rates, it is distinct from the pure cost of capital effect cited by the conventional money view.

Besides intellectual interest, there are several possible reasons why it would be useful to know if the credit channel of monetary transmission exists, and if so, how important it is. First, in an environment of rapid change in financial markets (due, for example, to financial innovation, deregulation, and new forms of financial competition), an understanding of the transmission mechanism may be important for gauging changes in the magnitude and timing of monetary policy's impact on the economy. Second, credit-related variables may prove to be useful indicators of the tightness or ease of policy, particularly during episodes, such as the recent recession, when some special factors appear to be at work in credit markets (see Section III.C below). Finally, the question whether bank lending is part of the monetary transmission process is closely related to the broader issue of whether banks are special, which is itself the key issue in current debates about reform of bank regulation and deposit insurance.

B. Empirical evidence for the credit channel

In looking for evidence for or against a credit channel of monetary transmission, a number of researchers have investigated the timing relationship between monetary tightening or loosening and bank lending. Focusing primarily on the pre-1980 period, Bernanke and Blinder (1992) found that a tightening of monetary policy, as indicated by a rise in the federal funds rate, was typically followed in the next few months by a decline in bank deposits and a similar decline in bank holdings of securities. Bank loans did not fall during the first months after a tightening; indeed, initially, loans rose slightly. However, Bernanke and Blinder's results indicated that within six to nine months after the policy change, banks typically began to rebuild their securities holdings and to reduce lending substantially, with the timing of the fall in lending corresponding closely to that of a rise in the unemployment rate. Similar empirical results have been found by Nakamura (1988), Romer and Romer (1990), and Kashyap and Stein (1992). Bernanke and Blinder interpreted this temporal pattern as being consistent with the basic credit channel story, that monetary tightening leads to reduced lending, which in turn depresses spending. They argued that the relatively slow reaction of lending could easily reflect the difficulty of rapidly adjusting loan portfolios.[17]

However, a potential problem with the Bernanke-Blinder (1992) interpretation (as they noted) is that a similar timing pattern from money to loans to output might arise if only the conventional money channel were operative. Suppose, for example, that a Fed tightening raised interest rates and induced firms to reduce investment spending, in standard textbook fashion. Then, even though the cause of the spending slowdown was the higher interest rate and not a reduced supply of loans, we would still expect to see a decline in bank lending following the policy change, as firms demanded less credit. Succinctly put, the fact that a decline in loans follows a monetary tightening does not tell us whether the supply of loans or the demand for loans has fallen.

One way to try to resolve the supply-versus-demand puzzle is to look at alternative (nonbank) forms of credit. On the one hand, if loans fall after a tightening of monetary policy because of a reduction in loan supply, as is implied by the credit view, then nonbank sources of credit should rise after a policy tightening as firms and other borrowers look to alternative lenders. On the other hand, if the reason for the slowdown in bank lending is a decline in credit demand, as suggested by the conventional money view, then all forms of credit extension should fall after monetary policy tightens.

Following up this intuition, Kashyap, Stein, and Wilcox (forthcoming) looked at the pattern of commercial paper issuance during the period since that market became important during the 1960s. They found that commercial paper issuance usually expanded sharply during periods of tight money, a development that they interpreted as supportive of the credit view.

The Kashyap et al. results were refined by Gertler and Gilchrist (1991, 1992), who used data from the Quarterly Financial Reports to compare the behavior of small and large manufacturing firms. Gertler and Gilchrist found, unsurprisingly, that the post-monetary-tightening increases in commercial paper issuance documented by Kashyap et al. entirely reflected increased borrowing by large firms (the only firms that typically have access to this market). However, a more surprising result obtained by Gertler and Gilchrist was that large firms also typically *increased* their bank loans during periods of tight money. In contrast, both total borrowings and bank loans of small firms were found to contract sharply following a monetary tightening, a difference reflected

[17]Another reason for the slow reaction is that bank balance sheet data on loans reflect the timing of actual takedowns, not of loan decisions.

in very pronounced differences in sales growth and inventory investment between large and small firms over the two years after a policy change.

Gertler and Gilchrist's finding that smaller firms take the brunt of tight money has been confirmed in a number of studies: Oliner and Rudebusch (1992) compared investment by small and large firms and found that small firms' capital investment spending is more sharply reduced after a monetary tightening. Kashyap, Lamont, and Stein (1992) analyzed a sample of publicly traded companies and found that the companies more likely to be bank-dependent (those with no bond ratings and low internal liquidity) cut inventories relatively more sharply during the 1981-82 monetary squeeze. In an earlier paper using Depression-era data, Hunter (1982) found that large firms were able to maintain and even expand their liquidity during the severe economic downturn of that period while small firms were not. Ramey (forthcoming) found that the ratio of small firm growth to large firm growth contained a good bit of information about the future course of GNP.

The impression that it is the smaller, more marginal borrowers who are hurt most by monetary tightening is also confirmed by studies of bank behavior. For example, Nakamura and Lang (1992) used Federal Reserve surveys of bank lending officers to show that loans made at one or more points above prime shrink relative to total loans during periods of tight money, a "flight to quality" phenomenon that suggests that banks cut off more marginal borrowers when monetary policy is restrictive.[18] In a similar spirit, Morgan (1992) found significant increases in the fraction of loans made under commitment during tight money periods (precommitted bank lines of credit are more likely to be held by larger, financially stronger borrowers).

The finding that it is loans to small firms, rather than total bank loans, that are most affected by Fed tightening is a bit different from the basic Bernanke-Blinder (1988) story. However, Gertler and Gilchrist argue that their result is nevertheless in the general spirit of the credit view. They point out that small firms are generally financially weaker (in a balance sheet sense) than large firms, and that the costs of lending to small firms (that is, costs of information-gathering and monitoring) are typically larger relative to the size of the loan. Also, the shorter expected lives of small firms reduce the value to a bank of having an ongoing relationship with a small firm. For these reasons, based on the sorts of considerations outlined in Section II, it seems plausible that if banks are forced to reduce their lending they will cut off credit to small firms first. In contrast, the conventional money view—which relies on cost of capital effects and ignores balance sheet factors—is hard put to explain the differential responses of small and large firms to tight money.[19]

The evidence discussed so far has focused on financial quantities such as money, lending, and commercial paper issuance. A complementary strategy would be to look at financial prices, that is, interest rates or interest rate spreads. For example, if the credit view is correct and tight monetary policies work by constricting bank loan supply, then in principle, during periods of tight money, bank loan rates ought to rise relative to open market rates (see Bernanke and Blinder 1988). Unfortunately, in practice, looking at loan interest rate series alone is unlikely to be helpful for sorting out the alternative hypotheses. The problem is that the true "price" of a bank loan is multidimensional, involving not only the contractual interest rate but a variety of other terms and conditions (for example, covenants, collateral requirements, and so on). Further, the usefulness of average loan rate series is compromised by the fact that the mix of credit risks assumed by banks is not constant over time: given the evidence discussed above for the idea that there is a "flight to quality" during tight money, for example, it is possible that the average rate on loans made might fall following a Fed tightening, even though the effective cost of funds to a borrower of given quality is rising.

While it is probably not useful to look at loan rates per se, there may be something to be gained from looking at interest rates on loan substitutes. An interesting case in point is the rate on commercial paper. A few years ago, Friedman and Kuttner (1992) and Stock and Watson (1989) observed independently that the spread between the four- to six-month prime commercial paper rate and the six-month Treasury bill rate has historically been an astonishingly good predictor of real economic activity (with a rise in the commercial paper rate relative to the Treasury bill rate signaling an imminent economic downturn). In preliminary work, Bernanke and Mishkin (1992) have found similar results for other countries. The question is, what is the economic reason for this predictive power?

The natural first hypothesis, that this spread was predictive because it reflected the market's perception of default risk, was found under closer examination to be inadequate. (Problems with this explanation included the fact that default by issuers of prime commercial paper is extremely rare and the finding that other natu-

[18] Wojnilower and Speagle (1962) made a similar observation much earlier.

[19] Independent of its impact on the technical debate about monetary transmission, the finding that monetary policy has a disproportionate effect on small firms—with the implication that the burdens of disinflation are not evenly shared—should be of interest to policymakers.

ral measures of default risk contained much less predictive power than the commercial paper spread.) Bernanke (1990) suggested that the paper-bill spread was a good predictor of economic activity because it was an indicator of the tightness of monetary policy. His argument was based on the logic of the credit view and complemented the findings on commercial paper issuance of Kashyap et al.: A tightening of monetary policy, if it reduces loan supply as suggested by the credit view, should force borrowers into the commercial paper market. Assuming imperfect illiquidity in that market, increased supply pressure should raise the commercial paper rate relative to the safe (Treasury bill) rate. Bernanke noted similar behavior by the spread between the bank certificate of deposit (CD) rate and the Treasury bill rate, behavior that is also consistent with the credit view if monetary tightening forces banks to try to obtain funds in the CD market.

Research on why the paper-bill spread was predictive in the past (and whether it will continue to be predictive in the future) is ongoing. The most detailed work has been by Friedman and Kuttner (forthcoming). Friedman and Kuttner agree that the transmission of monetary policy through credit is one reason for the predictive power of the spread, but they also advance an alternative hypothesis based on the cyclical behavior of firm cash flows. In brief, their idea is that whenever there is an expected downturn in final demand, whether due to monetary policy or some other reason, the combination of falling cash flows and unintended inventory accumulation creates a financing deficit for firms. This deficit forces firms into the commercial paper market (a contention that is generally consistent with the findings of Kashyap et al. about commercial paper issuance) and raises the paper-bill spread. Because this phenomenon occurs just at or before cyclical peaks, according to this explanation, an increase in the paper-bill spread signals bad times ahead.

The Friedman-Kuttner cash flows hypothesis is consistent with a scenario in which both the money and credit channels of monetary policy transmission are operative, and in which the shortage of cash flow results from the effects of tight money on final demand. (The idea of a cash flow shortage can also rationalize the findings of Bernanke and Blinder (1992) and Gertler and Gilchrist (1991) that bank loans to at least some firms initially rise after a monetary tightening.) However, the cash flows hypothesis is probably *not* consistent with a money-channel-only view of monetary transmission, for two reasons: First, absent restrictions on loan supply, the cash flow shortage story would imply an equally large increase in the demand for loans and in the issuance of commercial paper, but in fact after a monetary tightening almost all the marginal credit flows through the commercial paper market. Second (a related point), the cash flow shortage would seem to apply to small firms as well as large, but we know from Gertler and Gilchrist that small firm borrowing falls precipitously during periods of tight money.[20]

Much more could usefully be done to verify the existence of a credit channel for monetary policy. One possibility is to extend the U.S. empirical work to other countries. A potentially interesting case is that of Japan, whose financial system has evolved over the last twenty years from one in which most private borrowing was done through banks to a system much closer in form to that of the United States. Another possibility is to study the behavior of alternatives to bank credit other than commercial paper. Both of these avenues are being pursued in currently ongoing Princeton dissertations.[21]

C. Credit as a monetary policy indicator

The evidence I have cited so far is largely consistent with or supportive of the existence of a credit channel of monetary transmission. However, there are dissents from this conclusion in the literature, including notably King (1986), Romer and Romer (1990), and Ramey (forthcoming). The principal empirical point shared by all three of these papers is that in historical data, monetary aggregates have typically been significantly better forecasters of real economic activity than have credit variables such as bank loans. Therefore (these papers argue), the money channel of monetary policy transmission must be much more significant than the credit channel.

These results are perhaps most sharply put by Ramey (forthcoming). She constructs a trend-corrected measure of M2 velocity that does a very good job of forecasting measures of output in sample. While she also finds that some credit variables are good predictors, generally these variables lose their predictive power once the adjusted M2 velocity measure is included in the equation. She concludes that little is lost by ignoring the credit channel of monetary policy transmission.

In evaluating this evidence, I think that it is important

[20]It is also worth noting that the cash flows hypothesis has a strong affinity with the balance sheet effects emphasized by some supporters of the credit view. Neither the complete-markets model nor the conventional IS-LM model (which does not even distinguish between different forms of credit) is consistent with the cash flows hypothesis.

[21]David Fernandez is considering the case of Japan, and has so far found evidence on the timing relationship of monetary policy and bank lending that is similar to what has been seen in the United States. Jeffrey Nilsen has been looking at the behavior of trade credit, particularly at the possibility that wholesale and retail firms increase their use of trade credit when monetary policy tightens and bank loans become more difficult to obtain.

to distinguish between two questions: 1) Economically, does monetary policy have its effects by changing the relative supply of bank loans? 2) Given money, do credit variables provide useful additional information about the stance of monetary policy or the likely future trajectory of the economy? It is quite possible that the answer to the first question is "yes" while the answer to the second question is "no."

To see why, suppose that only the credit channel is operative—that is, imagine that firms do not respond to policy-induced changes in short-term interest rates, so that the money channel is closed down. Even under these extreme circumstances, with no role for the conventional channel to affect output, we would still expect a tightening of monetary policy (open market sales) to reduce the money supply. Further, consistent with the empirical findings of Bernanke and Blinder (1992), we would expect the change in the money supply to occur *earlier* in time than the change in loans (which Bernanke and Blinder found to be roughly contemporaneous with the change in output). In this scenario the change in the money supply would be a better *predictor* than loans of output—equivalently, a better monetary policy indicator—even though, by hypothesis, the actual effect of policy is being transmitted through loans only. Only if the link of the money supply to lending became unstable (say, because banks' portfolio preference for loans versus securities fluctuated), while the link of lending to the economy remained stable, would bank loans dominate money as a forecasting variable and monetary indicator.

Thus Ramey's finding, like earlier results on the predictive power of money versus credit, really has no bearing on the issue of whether monetary policy works through the money channel or the lending channel. Her finding does have a bearing on the choice of policy indicator, implying that M2 is the single best choice (at least among quantity variables). However, even this conclusion should be drawn very gingerly: it is obviously easier to find good indicators retrospectively than prospectively. Just as no one knew in advance that M1 velocity would collapse, we cannot be sure what will happen to M2 velocity in the future, and for that reason we should hedge our bets and consider other indicators as well. Indeed, as I explain further in Section V, the last recession is a nice example of a situation in which M2 behaved very strangely, and in which knowledge of the behavior of bank lending was helpful in interpreting that behavior.

IV. Crunches and overhangs: Other ways in which credit may matter macroeconomically

Although the role of credit in monetary transmission has received the most recent attention, the information-based analysis of credit can rationalize a number of other ways in which credit can play a macroeconomic role. I discuss the most important of these channels here. In parallel to Section II, I will first discuss macroeconomic effects of credit operating through the banking system, then turn to the macroeconomic implications of changes in the quality of borrowers' balance sheets.

A. Bank loans and the macroeconomy

If banks and other financial intermediaries are special in that they play a difficult-to-replace (if not literally unique role) in credit creation, then disruptions of normal banking activity may have macroeconomic consequences. Below I consider briefly some of the more obvious factors that may lead (and have led) to banking disruptions.

1. Bank runs and banking panics. Before the institution of deposit insurance, depositor runs on individual banks, as well as more widespread banking panics in which many banks experienced runs, occurred periodically in the United States.[22] By far the most severe episode of banking panics, however, occurred in the early stages of the Great Depression: the U.S. banking system was in almost constant crisis from the winter of 1930 until Roosevelt's bank holiday of March 1933.

What was the macroeconomic significance of Depression-era banking panics? The standard answer, given by the classic study of Friedman and Schwartz (1963), was that the banking panics depressed macroeconomic activity by inducing sharp declines in the national money supply.[23] Drawing on the information-based approach, Bernanke (1983) suggested that in addition to their monetary effects, banking panics hurt the economy by disrupting the normal flow of bank credit, with adverse consequences for both aggregate spending and aggregate supply. In support of his view, Bernanke cited contemporary complaints of credit restriction and shortage, and also presented statistical evidence suggesting that the monetary collapse of the 1930s was not big enough to rationalize the length and depth of the Depression on its own.

In subsequent work, Bernanke and James (1991) used a sample of twenty-four countries to investigate the effect of bank panics. Comparing eleven countries with serious banking panics to thirteen countries whose

[22]Calomiris and Gorton (1991) provide a detailed analysis of the recurrent panics of the nineteenth century.

[23]During banking panics, the public converts deposits to currency. The consequent loss of reserves by the banking system forces a contraction of deposits that is much greater than the accompanying increase in currency held by the public. Thus, absent Federal Reserve actions, banking panics contract the total money supply.

banking troubles were more contained, and holding constant initial macroeconomic conditions and money supplies, these authors found that the countries with banking panics suffered significantly more serious subsequent falls in output than the countries without panics.[24]

The hypothesis that bank failures during the Depression had important effects through the credit channel remains controversial (see Calomiris [forthcoming] for a recent survey of this and related issues). Without attempting to resolve this controversy here, I would only note that the issue is not simply of historical interest but has important policy implications. For example, while it is widely agreed that the Federal Reserve should act as a "lender of last resort" to the banking system, there is a dispute over whether the Fed should content itself with protecting the money supply (as suggested by Goodfriend and King 1988), or whether it should act more aggressively to protect lending and other functions of banks (and other financial institutions as well). It appears that current Fed policy favors the latter approach (see, for example, Brimmer 1989). Clearly, the issue turns on whether major problems in the banking system or other financial institutions would be disruptive to the economy for reasons over and above any effects they had on the money supply.

Similar issues arise in the debate over reforming bank regulation. Proposals such as "narrow banking" (Litan 1987), which by the way has many attractive features, are designed to protect the money supply while extricating the Federal Deposit Insurance Corporation from the uncomfortable position of having to evaluate the credit risks of bank loans. However, if the lending function of banks is also macroeconomically important, the narrow banking strategy would carry some risks. For example, it is conceivable, depending on the way that Litan's lending institutions were financed, that they could be subject to "slow runs" that would depress lending and be costly at least to some sectors of the economy. If the lending function of banks is macroeconomically significant, then reform along the lines of the recent Treasury proposal, which suggested continued insurance of banks with broad powers as long as tough capital requirements were met, would probably be preferable.

2. Disintermediation, jawboning, and credit controls. Government, intentionally or unintentionally, can interfere with the normal process of bank lending in a number of ways. Although there is some dispute about terminology, if these interventions are sufficiently serious they can lead to what is popularly known as a "credit crunch."

The classic example of a credit crunch is probably the brief episode of reduced bank lending in 1966 (see Burger 1969). The conventional interpretation of this episode, and of a similar episode in 1969-70, is that it was an example of disintermediation, in which the movement of Treasury bill rates above the Regulation Q ceiling precipitated sharp outflows of funds. After a careful review of the documentary evidence, Owens and Schreft (1992) concluded that the role of Regulation Q was overstated in those episodes, and that the primary reason for lending reductions was moral suasion and threats ("jawboning") from the Fed and various governmental branches. Whatever the specific source of the crunch, in both cases bank lending slowed significantly and the macroeconomy slipped from rapid expansion into a pause (1966) or a recession (1969-70).

In March of 1980, formal credit controls (which had been threatened but not used in earlier episodes) were imposed by the Carter Administration (see Schreft 1990). The controls took the form of direct restrictions on loan growth rates and marginal reserve requirements on additional credit extensions. The controls were reputedly "symbolic," but their real effect was powerful. Bank loans, which had been growing at an annualized rate of 15 to 20 percent before the imposition of controls, grew at only 2.5 percent in March and fell 5 percent in April (at annual rates). Consumer credit was hardest hit. The economy nosedived in the second quarter of 1980, with real GDP contracting at a 9.9 percent annual rate (Kashyap and Stein 1992) and the prime rate falling from 19 percent to 14 percent. The controls were lifted on July 3 and economic growth resumed.

None of these episodes were as dramatic as the Depression, but they do seem consistent with the view that restrictions of bank lending can have negative macroeconomic effects. Restrictions aimed only at banks would not have significant effects if borrowers could easily substitute to other credit sources. Thus the response of aggregate activity to these episodes is also evidence favoring the credit channel of monetary transmission.

3. The "capital crunch." Yet another factor affecting the ability of banks to lend is capital adequacy. A low level of capital reduces banks' ability to attract uninsured deposits and forces regulators to adopt tough lending standards or risk losses to the deposit insurance fund. Absent information problems, insufficient

[24] More specifically, Bernanke and James noted that in 1930, the year before the peak of banking crises worldwide, the countries that were to experience banking panics and those that were to escape panics experienced similar rates of deflation and output decline. In contrast, in 1932 (the year following the most intense banking crises), industrial production growth averaged −2 percent in countries that had avoided panics and −16 percent in countries that had not.

capital would be a purely transitory problem as banks could simply issue new equity. However, if information is imperfect, the markets may interpret the announcement of a new equity issue as indicative of hidden asset weakness, which drives down the share price and raises the effective cost of equity finance (Myers-Majluf 1984).

There is some evidence that a shortage of bank capital, resulting primarily from real estate losses but possibly exacerbated by tougher capital regulations and regulator oversight, constrained bank lending over the 1989-91 period. Syron (1991) argued that such a "capital crunch" was recently at work in New England, following the collapse of real estate prices there. A study by Peek and Rosengren (1992), which used data for all lending institutions in New England and carefully controlled for a variety of relevant characteristics, confirmed the relationship between capital adequacy and lending. Other studies with comparable or complementary findings include Bernanke and Lown (1991), Clair and Yeats (1991), Johnson (1991), Samolyk (1991), and Moore (1992).

Although the capital crunch surely did not help matters during the recent recession, Bernanke and Lown (1991) conclude that the reduced supply of bank loans was probably less important macroeconomically than the financial problems of borrowers. I discuss the 1990-91 recession in more detail in Section V.

B. Borrower balance sheets and the macroeconomy

Although issues relating to banking are more often discussed in the credit literature, the analysis of Section II implies that financial distress as reflected in the condition of borrowers' balance sheets can also affect economic performance.

1. Debt-deflation. Irving Fisher introduced the concept of "debt-deflation" in an article in the very first issue of *Econometrica* (1933). Fisher had in mind a dynamic process in which falling asset prices (perhaps set in train by a monetary contraction or the end of a bubble) bankrupted debtors, forcing them to make distress sales of their remaining assets; this outcome forced prices down further, continuing the process. Fisher felt that debt-deflation was a major cause of the Depression, and he wrote letters to Franklin Roosevelt pleading for price level stabilization. More recently, Kindleberger (1973), Mishkin (1978), and Bernanke (1983) have also suggested that borrower distress arising from deflation was an important factor in the Depression.

Fisher's debt-deflation concept has not generally been well understood. Its initially puzzling aspect is that while an unanticipated deflation clearly makes debtors worse off, it also makes creditors better off, and so is "only" a redistribution. Some Keynesians pointed out that a redistribution from debtors to creditors could reduce aggregate demand if debtors have a higher marginal propensity to consume than do creditors. However, this assumption is neither theoretically justified nor empirically obvious, since many creditors are small savers while some debtors are large corporations.

The adverse effects of debt-deflation can be better rationalized in terms of the modern literature on the role of balance sheets (Bernanke and Gertler 1990). A debt-deflation, which redistributes wealth away from borrowers, increases borrowers' need for external finance at the same time that it makes them less creditworthy. To the extent that current borrowers are also the people with special knowledge and access to new investment projects, a debt-deflation reduces aggregate spending by blocking potential investors' access to credit. For example, a Depression-era farmer, driven close to bankruptcy by falling crop prices, could neither pay for needed new farm equipment on his own nor obtain credit to do so. Thus some capital investment opportunities were effectively cut off from the economy by the process of debt-deflation.[25]

2. Overhang: The debt buildup of the 1980s. A financial phenomenon that received much attention was the buildup of corporate debt during the 1980s.[26] That decade saw sharp increases in ratios of debt to GNP and of interest expense to earnings (Kaufman 1987; Bernanke and Campbell 1988, 1990), as well as several years of negative net equity issuance, as firms recapitalized or underwent leveraged buyouts.

The buildup of debt in the U.S. corporate sector naturally raises two questions: 1) Why did it happen, and 2) what are its economic implications? Although space does not permit an exhaustive discussion of the complex debates that have raged about both of these questions, I will summarize some main points and try to make the connection between these issues and the themes examined in this paper.

The causes of the corporate debt buildup were disparate. One reason for the growth of debt was probably simple optimism (whether justified in an ex ante sense or not, I don't know); firms expected that future earnings growth would justify the increase in borrowing. The optimism story is consistent with the boom in the stock

[25]The creditors could take over the farm and hire the farmer to work it; but in this case the farmer's incentives to work hard and creatively would be diminished.

[26]Household debt also expanded; for brevity, and because my own research has focused on corporate debt, I do not discuss that development here. For a popular survey of the corporate debt issue, see Bernanke (1989).

market (as well as the increases in household debt) that also occurred during the decade. Indeed, despite the large absolute increases in debt and interest burdens during the 1980s, the equally sharp rise in share prices implied that debt-equity ratios did not change significantly. Other factors that economists have cited as contributing to the expansion in debt include tax advantages created by the tax reforms of the early 1980s, deregulation and reduced antitrust enforcement, the development of a liquid secondary market for junk bonds, and expectations of continued inflation or asset price increases.

Another explanation for the increase in debt comes straight from the theoretical literature described in Section II. Recall that a basic implication of that literature is that capital structure can affect management decisions and thus the efficiency of the firm (Jensen and Meckling 1976). During the 1980s, Michael Jensen of Harvard Business School brought his academic research to the real world by actively advocating the use of higher debt levels to improve corporate performance. Jensen publicized his "free cash flow theory," which claimed that increased leverage would particularly benefit the shareholders of mature, cash-rich firms (Jensen 1986). Jensen argued that managers of this type of corporation, having no really good way to invest the "free cash flow" thrown off by existing, profitable operations, would be tempted to waste these funds in expanding their corporate empires into areas in which they did not have adequate expertise or information. According to Jensen, high leverage reduces the scope for this type of activity by diverting cash flow into interest payments, and thus increases the value of the firm.[27] While Jensen's personal advocacy was probably not the only reason for increased attention to the possible efficiency benefits of leverage, discussions of the leverage phenomenon in the business press did frequently point to the cost savings and other efficiencies that higher debt would force on companies. The stock market may have believed this story as well, since share prices typically rose sharply in response to announcements of recapitalizations or leveraged buyouts.

What about the effects of the debt buildup of the 1980s? In assessing the economic effects of the debt buildup, I think it is important to distinguish microeconomic/productivity-related effects from macroeconomic/business cycle effects.

At the microeconomic level, the debate has centered on whether firms that increased leverage actually achieved productivity gains, as suggested by Jensen's free cash flow theory and similar theories. Empirical analysis of this question is complicated considerably by the problems of interpreting accounting data of firms undergoing financial reorganization, and of isolating increased profitability due to increased efficiency from other sources of increased profit such as tax benefits or renegotiations of union contracts. My reading of this debate, which is still ongoing, is that increased leverage led to modest productivity gains in some cases. Perhaps the most compelling evidence in favor of productivity benefits has been found by Lichtenberg and Siegel (1990a, 1990b), who showed that LBO firms typically achieved some efficiency gains by streamlining their administrative and management functions (and by reducing staff accordingly). Such economies are important, of course, but on the other hand they are unlikely to generate ongoing productivity gains.

The macroeconomic question is, does high leverage make recessions worse and recoveries slower? The type of analysis described in this paper implies that the answer to this question is yes: the same theoretical arguments that say that debt will induce tough cost-cutting by firms in normal times suggest that debt-laden firms will be even quicker to shed workers or scrap expansion plans when financial conditions worsen. When a recession causes a general decline in sales and profits, firms with already-high levels of debt and interest burden face a tighter cash flow squeeze. At the same time, a softening of asset values, typical of recession, further worsens the balance sheets of the most leveraged firms. The cash flow shortfall, coupled with the greater difficulty of raising external funds, will tend to depress firms' spending. In a feedback loop reminiscent of the debt-deflation phenomenon, this reduction in spending may aggravate the recession and force yet other firms into financial difficulties.

The direct evidence that the debt buildup of the 1980s worsened the recent recession is still somewhat limited at this point. Nevertheless, as I explain further in the next section, there is more in the way of circumstantial evidence, including notably the unusually early decline in employment and inventories (suggestive of tough cost-cutting by leveraged firms) and the slow recovery of spending after the initial recessionary stimuli had passed. The employment and inventory response observed in 1990-91 is consistent with studies by Cantor (1990) and Sharpe (1992), who showed that highly leveraged firms tend to cut employment more sharply in economic downturns, and by Kashyap, Lamont, and Stein (1992), cited earlier, who found a link between firms' financial condition and their inventory behavior in the 1981-82 recession. As I indicate below, the demand for external finance seemed unusually weak in the last recession, a circumstance that is also suggestive of the

[27]Note the close similarity of this argument to the Jensen-Meckling discussion of the agency costs of equity finance. Note also that Jensen, in his later argument, ignored the possible agency costs of debt discussed in his earlier work.

weakness of borrower balance sheets.

From the policy perspective, it is important to recognize that the economic costs and benefits of leverage may be quite different at the firm level and at the level of the whole economy. In particular, since firms will include as a benefit of leverage its tax shield but exclude as a cost the contribution of leverage to macroeconomic instability, it is likely that firms on their own will use more debt than is socially optimal. This argument suggests that tax reforms to reduce the relative advantage of debt finance would be desirable. More subtle suggestions are to allow debt contracts to have "recession clauses" that index repayments to macroeconomic conditions (Gertler and Hubbard 1989) and to restructure the regulation of corporate governance in ways to allow for increased management accountability to shareholders without the device of high leverage.

3. Balance sheets and cyclical dynamics. Whatever the final conclusion concerning the role of leverage in the last recession, it is interesting to ask whether such financial dynamics might be part of most if not all recessions. Over the years many authors have developed variations on that general theme: for example, it has been argued that economic expansions, by leading to a parallel expansion or overexpansion of credit, plant the seed of a financial crunch or collapse, which then triggers the economic decline (see Minsky 1964; Wojnilowner 1980; and Eckstein and Sinai 1986).

Work based on the imperfect information approach supports the view that financial factors are important in the business cycle, although the mechanism identified is somewhat different. For example, Bernanke and Gertler (1989) analyze a sort of "financial accelerator" effect, in which balance sheet conditions propagate nonfinancial initiating shocks.[28] In their story, an initial negative shock to productivity or spending causes firms' internal liquidity to fall and worsens their balance sheets. These adverse financial developments force firms to reduce their spending, a response that worsens and extends the recession. Bernanke and Gertler's analysis is consistent with recent empirical work by Hardouvelis and Wizman (1992), who find that the cost of funds of financially weaker firms tends to rise in recessions, despite the general procyclicality of interest rates. I expect to see a good bit more research in this area, including the addition of financial dynamics to "real business cycle" macromodels, whose proponents have up until now given little attention to monetary and financial factors.

[28]See also Greenwald and Stiglitz (1988) and Gertler and Hubbard (1989).

V. An interpretation of the 1990-91 recession

In the introduction to this paper I referred to the conventional wisdom that factors such as the "credit crunch" and overleverage had played an important role in the recent recession. In this section I briefly give my own impressions of how financial factors contributed to the 1990-91 downturn. I draw heavily on Bernanke-Lown (1991), to which readers are referred for further details. The companion paper for this conference looks much more extensively at the recent experience, and particularly at how financial developments over the previous decade set the stage for this recession.

From the point of view of conventional macro analysts, the 1990-91 recession had some puzzling aspects. The most puzzling of these was the slow recovery of the economy once what appeared to be the initial stimulus—the Iraqi invasion of Kuwait, which both inflated oil prices and punctured consumer confidence—had been reversed. In particular, conventional reference points such as the ratio of inventories to sales led to substantial overestimates of the likely speed of recovery in the second half of 1991 and in 1992. As the economy continued to sputter, the claim that financial factors were retarding recovery began to get a closer look.

To get some sense of the role of credit in the recent recession, Lown and I studied the behavior of loans by banks and similar intermediaries. We found that the decline in loan growth during the 1990-91 period was noticeably worse than is typical during a recession. For example, over the first three quarters of the 1990-91 contraction (which has turned out to be the peak-to-trough period), we found that total lending by domestically chartered commercial banks rose by only 1.7 percent, while total intermediary lending (including savings and loan associations) fell by 3.6 percent—in both cases, a weaker performance than in any of the previous five recessions. (Taking account of loan securitization, which slowed markedly during the period, would probably make those growth rates even lower.) We also found the lending slowdown to be strongly regionally concentrated, with the sharpest contraction by far in New England, followed by the mid-Atlantic region.

As I observed in Section III, a potential source of slower loan growth in general is tightening of monetary policy. Interestingly, the evidence indicates that 1990-91 might be the only recession since the 1950s in which tight money was *not* a significant factor in the slowdown of lending. The typical tight money episode involves 1) a sharp increase in the federal funds rate and other short-term rates (implying an inverted yield curve); 2) increased issuance of CDs and other managed liabilities by banks suffering a drain of core deposits; 3)

increased commercial paper issuance as firms substitute away from bank loans; and 4) increases in CD and commercial paper rates relative to bill rates, reflecting the supply pressure of new issuances. Although some of these factors were relevant in 1988-89, none was present in the 1990-91 period. Instead, this time monetary policy became easier at an unusually early point in the cycle.

If monetary policy did not cause the unusually slow rate of loan growth, what did? As noted in Section IV, a part of the story was the "capital crunch" problem described by Syron (1991). In a pattern that was most visible in New England and the Northeast generally, falling real estate values increased the rate of loan losses of commercial banks. The resulting depletion of bank capital—together with related factors such as the new Basle capital standards and the increased vigilance of regulators—reduced the ability of some banks to lend. This cutback of bank lending was far from a universal phenomenon, but it did cause problems for some borrowers.

However, although supply restriction explains some of the weak loan growth, Lown and I concluded that an unusual decline in the demand for loans was a more important cause of the slowdown. While we supported this conclusion with econometric estimates, our main piece of evidence was the pattern of credit substitution: we found that, unlike the typical recession in which alternatives to bank credit (such as commercial paper) expand when bank loans contract, during the 1990-91 period all forms of credit contracted roughly proportionally, indicating a general decline in credit demand. In contrast, during 1989, alternatives to bank loans grew as bank lending slowed, a pattern more typical of a "credit crunch."

The obvious next question is, what caused the *unusually* severe decline in the demand for credit? In our article, Lown and I did not decompose this shift in demand into its sources, but for reasons discussed in the last section I find it plausible that the burdens of corporate and household debt and the generally weakened condition of balance sheets were significant factors. The extra weight of debt and interest burdens, together with falls in asset prices, can explain why the drop in the demand for credit was worse than normal for a recession. Standard indicators of financial condition ranging from loan losses to bankruptcy rates to the ratio of interest to cash flows all suggested unusual financial stresses during the recession.

If one is looking for a single cause or starting point of the recession, the credit markets perspective I have surveyed in this paper would suggest looking past the Iraqi invasion to the real estate boom and bust that was already in its latter stages by 1990. The fall in real estate prices and the overhang of empty office space had a number of direct negative effects on aggregate demand, including reductions of consumer wealth and confidence and dire implications for the construction industry. However, this bust probably also had important indirect effects through its impact on financial conditions, both by depleting bank capital and by increasing financial distress among potential borrowers. Neither the direct or indirect effects are of the type that can be resolved quickly, a difficulty that may help to explain the slowness of the recovery. Only recently, as banks have moved well toward recapitalizing themselves and borrowers have reduced their debt burdens, has the economy begun to rebound significantly.

Several implications for macroeconomic policy can be drawn from the credit markets perspective on the recession. First, the characterization of the lending slowdown as being largely demand-driven is good news for bank regulators and examiners, who shouldered more than a reasonable amount of blame for the recession. From a macroeconomic policy point of view, however, it makes little difference whether a credit crunch or a debt overhang is the more important. Either phenomenon is properly thought of as a malfunction of the credit creation mechanism that prevents the economy from reaching its potential.

Second, contrary to some people's impressions, even if banks' and borrowers' problems are severe, monetary policy does not become impotent to affect the economy. Monetary ease can still lower interest rates (the money channel), stimulating demand in interest-sensitive sectors where credit constraints are less serious, as well as stimulating exports by weakening the dollar. From the credit perspective, lower interest rates, by reducing the flow of interest payments and raising asset values, also improve the liquidity and balance sheet positions of borrowers. Finally, even when capital problems constrain many banks, there are always others (including new entrants) that are able to lend.

Although monetary policy is not rendered impotent by credit problems, this tool can become more difficult to use when the credit creation process is not working well. A particular problem is the interpretation of monetary indicators. If a malfunctioning of the credit creation mechanism artificially reduces the demand for funds, driving down market interest rates, then interest rate indicators will overstate the degree of monetary ease.[29] Conversely, the unwillingness of banks to issue managed liabilities when they do not have the capital to support lending may artificially depress the broad

[29] In the IS-LM-type model of Bernanke-Blinder (1988), either a capital crunch in banking or a debt overhang can be thought of as reducing desired spending at any given safe interest rate and thus shifting the IS curve down and to the left.

money aggregates, overstating the degree of monetary tightness. Both types of indicator problems seemed to occur during the recent recession.

VI. Conclusion: Institutional changes and the role of credit

A great problem for academics doing research on financial markets, as well as for participants in those markets, is adjusting to the pace of institutional change. In recent years in particular, deregulation, financial innovation, and internationalization have changed financial markets radically. An important question is how these changes, ongoing and prospective, will affect the role of credit in the macroeconomy.

In one sense, I do not think that the fundamental role of the credit creation process in the economy will be affected much at all by the process of financial change. Despite the greatly increased sophistication and flexibility of financial arrangements, as well as improved communications and computation, potential borrowers must still be screened, evaluated, and monitored by experienced individuals. Thus there will continue to be a special role for banks or similar institutions.[30] This basic fact seems unavoidable, despite the trend to securitization and other developments that admittedly have increased standardization of lending practices and improved the liquidity of bank assets. Similarly, new types of financial instruments have not significantly reduced the importance of firms' balance sheets or the cyclicality of credit risks. Although financial arrangements will become more complex, I expect that financial factors will continue to play a role in the business cycle, and that the tools economists have developed will be useful in understanding that role.

[30]Becketti and Morris (1992) find empirically that while the substitutability of bank loans with other sources has increased over time, bank loans remain "special" for many borrowers.

However, there is a somewhat narrower area in which the evolution of financial markets may fundamentally change the role of credit in the economy. That area is the realm of monetary policy, discussed in Section III. In particular, a number of financial trends may contribute to a weakening of the credit channel of monetary transmission in the years to come. First, the deepening of markets for bank-managed liabilities, increased securitization, and the removal of reserve requirements on managed liabilities will all act to make it easier for banks to insulate their sources of funds from the effects of open market operations. Second, the development of alternative credit sources, ranging from finance companies to overseas lenders, will both reduce the Fed's influence on the volume of lending and increase the ability of borrowers to substitute away from bank loans.

At the same time that this is happening, other trends will also be weakening the conventional money channel of monetary transmission: these trends include the proliferation of money substitutes—including substitutes for currency such as debit cards—and the phasing out of bank reserve requirements. By reducing the demand for Fed liabilities (and making that demand more unstable), these changes may well make it more difficult for the Fed to control short-term interest rates.

As monetary control weakens, the temptation may arise to try to arrest the process of change in financial markets (a strategy followed to some extent by the German Bundesbank, for example). This temptation should be resisted, because most of the changes in financial markets are acting to make the credit creation process (and thus the economy) more efficient. Using monetary policy to influence the economy will become more difficult, but—at least until we move to a completely cashless society—it should still be feasible. I am hopeful that the current wave of research on the role of credit in the macroeconomy will be of some practical use in that effort.

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Comments on "Credit in the Macroeconomy"

The Role of Credit in Economic Activity

*by David M. Jones**

Early in the 1990-92 period, an unusual bank credit "crunch" emerged. It involved a sudden tightening in the terms of, or in some cases, a sharp curtailment of, new loans supplied by depository institutions. This credit crunch forced many borrowers with no alternative sources of credit to curtail their borrowing and spending activities, thereby contributing importantly to the economic downturn. The latest version of a credit crunch served to shatter borrower confidence because it was so arbitrary, sudden, and unpredictable. Consumer and business borrowers who suddenly (and many thought unfairly) lost their credit lifelines were deeply shaken psychologically, and as a result, they sharply reduced spending, resulting in a decline in loan demand. Among the more lasting effects of this credit crunch have been much closer linkages between new orders and production for items ranging from new homes to machine tools.

This new version of a credit crunch was not triggered in the traditional way by Federal Reserve tightening actions that interacted with earlier Regulation Q ceilings on time deposits to produce predictable bouts of disintermediation. This credit crunch also differs from other occasions when government actions have operated to constrain the supply of bank credit—for example, the Fed's September 1966 letter threatening to restrain banks' access to the Fed discount window unless banks curtailed their business loans and President Jimmy Carter's March-July 1980 credit controls. Uniquely, the latest credit crunch arose from the coincidence of several contemporary financial events—especially the negative fallout from the savings and loan (S & L) debacle and a toughening in capital ratios by domestic bank regulators and by international agreement among regulators under the Basle Accord of July 1988. Also helping to provide a fertile environment for this credit crunch was the bursting of the financial bubble of the 1980s. Some of the major events signaling the puncturing of the financial bubble included the stock market crash of October 1987, the stock market collapse of 1989 (which finally ended the corporate takeover frenzy), the signing into law of the Financial Institution Reform, Recovery and Enforcement Act (FIRREA) in August 1989, the bankruptcy of Drexel in February 1990, and the temporary drying up of the corporate junk bond market around the same time.

The main point of this analysis is that the behavior associated with the bank credit lifeline to individual and business borrowers is central to the monetary transmission mechanism. The 1990-92 experience convincingly demonstrates that the interaction between bank loan restraint, weakened household and business balance sheets, and related recurring bouts of depressed psychology and spending operated to help produce a prolonged period of recession and slow growth.

Factors behind the credit crunch

The primary factor behind the recent bank credit crunch was the negative public fallout from the S & L debacle. Facing a bill of perhaps as much as $200 billion to bail out the S & L industry (that is, to pay off depositors in insolvent S & Ls), angry taxpayers exerted great pres-

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sure on Congress, which had unwisely liberalized S & L investment regulations and raised deposit insurance ceilings in the early 1980s. In turn, Congress, through endless public hearings, tried to pass the buck by exerting pressure on the regulators of depository institutions (many of whom had also been too lax during the speculative financial frenzy of the 1980s). To make up for past regulatory oversights, examiners in the field began increasing their standards for rating bank risk in 1989 and launched a frantic search for bad loans that exerted extreme pressures on bank loan officers. In their effort to weed out every conceivable bad loan so as to be protected from future criticism, field examiners created a new asset category dubbed nonperforming-performing loans. These were loans that were current on interest payments but were thought by regulators to be suspect owing to the borrower's future potentially shaky financial condition. Fearful of reprimand, salary cuts, or even losing their jobs if risky new loans went bad, bank credit officers suddenly found it easy to turn prospective borrowers away. Indeed, in some cases, bank loan committees were reported to have broken into applause when no new loans were presented at their routine meetings. Moreover, for many banks, the easiest answer both for cost-cutting purposes and for purposes of avoiding new loan risks was to drastically reduce loan personnel, especially in such high-risk lending areas as real estate. The fewer the number of loan officers, the fewer the number of loan applications that could be processed.

Underlying this cutoff in the supply of depository institution credit were regulators' fears that if they allowed banks to take excessive new loan risks they could be next in line to incur the public's wrath over another bailout. It was simply easier to cut off the supply of credit to prospective individual and business borrowers altogether than to risk the kind of public condemnation that the S & Ls had suffered.

A second factor contributing to the credit crunch was the well-intentioned but poorly timed toughening in bank capital requirements on a worldwide scale by agreement among regulators in the form of the Basle Accord of July 1988. Domestic bank regulators, in the wake of the S & L disaster, wanted to be sure that the banking system would not follow suit, requiring yet another politically disastrous taxpayer bailout. On the legislative front, Congress passed the already noted FIRREA legislation in 1989 to bail out the S & Ls, and, after seemingly endless negotiations, it passed the FDIC Improvement Act of 1991 to try to head off a similar debacle in commercial banks. On the international front, the Basle Accord toughened bank capital requirements in all major industrialized countries. Under this accord, risk-based capital-asset ratios were to be increased to 8 percent. U.S. banks began to phase in the tougher capital requirements under the Basle Accord in 1989 with a view to fully implementing them by the end of 1992.

The main problem was that all this attention was given to stronger capital ratios during a prolonged period of recession and weak economic growth. In contrast, the traditional notion has been that a banking institution should build up its capital position in good times, when profits are plentiful, and then use this strengthened capital position as a cushion against unforeseen losses in bad times. Facing worldwide regulatory demands that capital ratios be increased in bad times—when banks were coping with bad loans, poor profits, and debt downgradings—many banks had little choice but to downsize their asset and liability footings, in many cases cutting off new lending activity altogether. Certainly, the alternative of new bank equity offerings to rebuild capital ratios seemed unattractive in these circumstances, with bank stock prices falling, the cost of capital rising, and the stigma of financial weakness increasingly attached to banks forced into the capital markets to raise equity funds in such unfavorable conditions. This stigma was akin to that traditionally associated with excessive reliance on the Fed discount window; heavy bank borrowing at the discount window has been viewed as a sign of financial weakness. In the recent past this has been underscored most prominently by heavy use of discount window advances in the cases of the depositors' run on Continental Bank in 1984, the run on First Republic Bank in 1988, and the failure of the Bank of New England in 1991.

A third coincidental factor providing a fertile environment for the credit crunch was more traditional in nature. It took the form of the unwinding of the debt excesses of the 1980s. This cycle was not much different from the traditional boom-bust financial cycles. For example, there was in the 1980s a frenzy of corporate mergers and acquisitions involving the inflation of corporate assets and a massive substitution of debt for equity on corporate balance sheets. Households also got into the act by borrowing heavily to support their spending, especially on real estate. Banks, many of whom had begun the 1980s with bad loans to less developed countries (LDCs), were not to be left out of the 1980s financial follies. But this meant that banks would end the 1980s with new categories of bad loans, including those made in connection with highly leveraged corporate takeovers and speculative real estate ventures. Finally, even the federal government had to get into the act by running huge budget deficits, thereby greatly expanding total federal debt outstanding (currently approaching $4 trillion), and sharply reducing the government's leeway to use future discretionary fiscal

stimulus to counter recession.

This financial bubble led to an explosion of debt relative to GDP. The excessive rate of growth in debt supported speculation and higher asset prices. By the late 1980s, the overinflated financial bubble was ready to burst.

During 1990-92, the unwinding of these debt excesses produced a "balance sheet" recession and a prolonged period of halting growth. Individuals and businesses curtailed spending in order to reduce heavy debt-servicing burdens. These debt-servicing burdens were made all the more onerous by the new anti-debt balance sheet mentality of lenders judging these borrowers. To make matters worse, real estate values plummeted in most regions of the country.

Evidence of the curtailment of credit supply

The cutoff in the supply of credit by depository institutions apparently came early in the 1990-92 period, and this set in motion a progressive deterioration in economic conditions and a related decline in the demand for credit that was felt in full later in this period. Clearly, these forces produced a pronounced decline in total credit growth (domestic nonfinancial debt) beginning in earnest in the final quarter of 1990 and continuing through the third quarter of 1992. As the accompanying table shows, this decline in total debt growth reflected a pronounced drop in nonfederal debt growth. Within the nonfederal debt category, both households and businesses dramatically slowed their debt growth.

The Fed's Senior Loan Officer Opinion Survey on

Growth of Domestic Nonfinancial Debt
Percent Changes

				Nonfederal			
		Total	U.S. Government	Total	House-holds	Business	State and Local Governments
1976		10.9	15.6	9.8	12.1	8.2	8.4
1977		13.0	11.0	13.5	16.9	11.9	8.4
1978		13.5	9.2	14.6	17.3	13.0	11.0
1979		11.9	5.8	13.3	14.9	13.8	5.4
1980		9.4	11.8	8.9	8.7	10.2	3.6
1981		9.8	11.6	9.4	7.9	11.6	5.2
1982		9.4	19.7	7.0	5.6	7.8	9.3
1983		11.7	18.9	9.9	11.6	8.3	9.7
1984		14.5	16.9	13.8	13.2	15.4	9.1
1985		15.0	16.5	14.5	14.3	11.5	31.3
1986		12.9	13.6	12.7	14.1	11.9	10.5
1987		9.2	8.0	9.6	11.5	7.1	13.4
1988		9.1	8.0	9.4	11.1	8.3	7.0
				Quarterly Data			
1989—	I	7.7	7.2	7.9	7.7	7.9	8.3
	II	7.8	6.0	8.4	8.7	8.5	6.5
	III	7.7	6.3	8.1	10.6	5.4	9.2
	IV	7.6	7.6	7.6	9.9	5.0	8.6
1990—	I	8.8	10.9	8.2	11.1	8.3	9.1
	II	6.0	8.8	5.2	6.5	3.8	5.7
	III	6.2	11.3	4.8	6.3	3.2	4.4
	IV	4.7	11.1	2.8	4.3	1.1	4.1
1991—	I	4.2	9.1	2.8	4.3	0.9	4.2
	II	5.0	10.8	3.2	4.9	1.1	4.4
	III	3.7	11.0	1.4	3.5	−1.6	4.3
	IV	3.7	11.9	1.0	3.8	−2.8	4.7
1992—	I	6.0	13.3	3.5	5.5	1.0	5.1
	II	4.7	12.3	2.2	3.6	−0.7	6.9
	III	3.3	6.5	2.2	3.7	−0.3	5.4

Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts.
Note: Quarterly data are seasonally adjusted annual rates.

Bank Lending Practices can be used to help determine the extent to which this slowing in credit growth might have been attributable primarily to constraints on the supply side early in the period and later on to a weakening in loan demand. Specifically, during the critical first four months of 1990, the percent of domestic bank respondents in this Fed survey reporting a net tightening in lending standards or terms for commercial and industrial non-merger-related loans climbed to nearly 55 percent. This suggests that the slowing in credit growth at the beginning of the prolonged period of recession and slow growth may have been largely due to depository institutions' lending restraint. During the period from May 1990 through January 1991, the percent of bank respondents reporting a net tightening in lending standards eased only slightly to a 35 to 46 percent range, suggesting that lending restraint on the supply side was still significant. In addition, it should be noted that there were also some restraints on the supply of credit in the capital markets during this period, as evidenced by the drying up of investments by mutual funds and other nonbank institutions in nonprime commercial paper (reflecting tougher Securities and Exchange Commission limits on investment in nonprime commercial paper) and in the contracting corporate junk bond market.

The early indications of the bank credit crunch spurred the Bush Administration regulators (including the head of the Federal Deposit Insurance Corporation, the Fed Chairman, and the Comptroller of the Currency, who arranged the meeting) to request an unusual May 10, 1990, meeting between regulators and senior officials of major commercial banks. In this face-to-face encounter, the regulators encouraged the skeptical bankers to continue to make loans to financially sound consumer and business borrowers. Bankers were worried that the stifling combination of tougher regulator scrutiny at a time of weakening economic activity and growing uncertainties would raise the threat that any new loan would eventually be classified a bad one. There followed other meetings involving regulators and Bush Administration officials on the dangerously escalating bank credit crunch, including one particularly contentious meeting scheduled with President Bush on November 14, 1990. At this meeting, attended by Fed Chairman Greenspan, Treasury Secretary Nicholas Brady, Commerce Secretary Robert Mosbacher, and White House Chief of Staff John Sununu, both Mosbacher and Sununu strenuously argued that bank regulators were too tough and that they were thus restricting the flow of credit needed to keep the economy healthy. To underscore his concern with the credit crunch, President Bush even called in his January 29, 1991, State of the Union message for "sound banks" to make "sound loans, now."

Subsequently, during the period from February 1991 through October 1991, the percent of domestic bank respondents in the Fed survey reporting a net tightening in lending standards or terms dropped to a more modest 8 to 23 percent range. Accordingly, this somewhat less aggressive tightening in bank loan terms could reflect a more equal split in relative supply and demand constraints on credit growth.

The meeting-to-end-all-meetings on the subject of the credit crunch came belatedly on December 16, 1991, in Baltimore, Maryland, when all senior bank examiners from the government regulatory agencies were called together by Bush Administration Treasury officials and browbeaten into easing up in their search for bad loans, especially in the real estate sector. The arm twisting went to the point of forcing all senior examiners to sign a "pledge" that they would, in essence, adopt a more uniform and less threatening set of criteria to identify bad real estate loans. However, there apparently was a considerable time lag before the senior examiners were able to moderate the tough attitudes towards bank loan risk of the hands-on examiners in the field. In addition, in another unprecedented move, Bush administration officials gave individual banks that felt they had been unfairly treated by their government examiners a secret "back door" means of communicating these protests to the examiners' superiors.

Because of these increasingly brazen Bush Administration anti-crunch efforts, the percent of domestic respondents reporting a net tightening in lending standards or terms fell sharply during the more recent November 1991-November 1992 period to a minimal 3 percent or less. This pronounced drop in banks' net tightening in lending standards suggests that continued slow nonfederal debt growth through the third quarter of 1992 was mostly attributable to weak credit demands.

Reflecting Federal Reserve efforts to ease money market conditions, the federal funds rate has declined to 3 percent (the lowest level in three decades) from 9¾ percent in mid-1989. During this period, short-term interest rates have fallen much more sharply than longer term rates, producing an unusually steep upward-sloping yield curve.

On the loan availability side, the sharper decline in short-term interest rates than in long-term rates has provided banks with an extremely favorable net interest margin. In this environment, banks have greatly increased their liquidity holdings through increased purchases of U.S. government securities and have, as a result of improving profits, gradually strengthened their capital positions. The resulting gain in bank stock prices underscores this progress. Thus, banks are currently showing somewhat greater willingness to make

new loans, as evidenced by a recent slight pickup in business, individual, and mortgage loan growth.

On the loan demand side, there have been several major waves of debt restructuring in the lower interest rate environment. As the current decade began, both individuals and businesses were strangling on too much debt as they faced a prolonged period of weak economic growth that depressed income and profits. Thus, as interest rates fell sharply in late 1991 and again in mid-1992, individuals eagerly refinanced their high-interest-rate mortgages with debt-carrying lower interest rates to lessen their monthly debt-servicing payments and improve their cash flow. Judging from a pronounced decline in the ratio of debt-servicing payments to disposable personal income, individuals may be as much as 70 percent complete in their debt-restructuring efforts. Businesses also have replaced high coupon debt with lower coupon debt and raised funds in the equity market to repay debt. With better access to capital market funds sources, business debt-restructuring efforts are perhaps 90 percent complete, as suggested by the declining ratio of gross corporate interest payments to cash flow. These debt-restructuring efforts are absolutely essential to set the stage for renewed credit demands in support of economic expansion. With the lion's share of this debt restructuring now behind us, the prospect is for gradually accelerating economic expansion during the remainder of this year and next.

The credit transmission channel

An important credit channel that influences economic activity is clearly evident in the 1990-92 experience. The credit channel exists because bank loans and other forms of credit are imperfect substitutes. When banks tighten credit terms or cut off new loan activity altogether, many borrowers find it inconvenient, costly, or even impossible to find alternative sources of nonbank credit. The unique feature of the 1990-92 credit crunch experience was that it was not triggered, as in past instances, by Federal Reserve tightening actions. Nevertheless, the powerful impact of the credit channel was perhaps even more clearly demonstrated in the new version of the credit crunch.

The timing of the credit supply restriction is crucial to understanding how the credit channel worked in the latest economic downturn. The credit crunch probably began in early 1990. This initial constraint on the supply of credit was shocking to debt-heavy borrowers because it was so abrupt, arbitrary, and unpredictable. Borrowers' psychology plunged and spending was curtailed for a prolonged period. Once the recession got under way, debt contraction and asset price deflation began to become a self-reinforcing process. Debt-heavy borrowers were forced to cut back on spending to try to reduce their excessive 1980s debt exposure, eventually sharply curtailing credit demands. To make matters worse, balance sheets were further strained on the asset side as prices of homes, land, and other items plummeted. Furthermore, declining wealth positions served to further depress consumer spending.

It is interesting to note that the powerful behavioral forces in the credit channel seem to far exceed those in the weaker money supply channel. This is evident in the recent efforts of most Fed policymakers to downplay the monetary aggregates as intermediate policy targets. The monetary aggregates have always proven inadequate as intermediate policy indicators because they represent the arbitrary selection of certain bank liabilities. This limited "slice" from the liability side of the bank balance sheet simply fails to tell the whole story of credit availability. In the case of the most closely followed M2 aggregate in particular, several factors have operated to loosen its relationship with economic activity. (The M2 monetary aggregate is defined as M1 plus overnight repurchase agreements, overnight Eurodollars, household money market mutual fund balances, savings, and small-denomination time deposits.) Most important, there has been a sharply depressing impact on M2 from the closings of many S & Ls and banks under the already noted government assistance programs. In addition, at a time when the yield curve has had an extremely steep upward slope (that is, short-term interest rates have been far below longer term interest rates), there has been a massive shift of funds out of the lower yielding CD components of M2 into bond funds and other capital market instruments not included in M2. These forces have served to depress M2 growth greatly relative to its expected relationship to economic activity. In late 1992, for example, M2 growth remained weak despite a pronounced acceleration in nominal GDP growth.

In view of the importance of the credit channel, Fed officials should permanently deemphasize the M2 monetary aggregate as an intermediate policy target. In evaluating whether financial conditions are adequately supporting maximum sustainable noninflationary growth, the monetary authorities should instead focus on bank loan growth and on household and business borrowing in the capital markets, as reflected in the nonfederal domestic nonfinancial debt aggregate.

The nonfederal domestic nonfinancial debt aggregate (measuring credit extended by both bank and nonbank sources) is especially important as a monetary indicator because it reflects the powerful structural force of securitization. To an increasing extent, banks have been originating, pooling, and then selling into the capital markets various mortgage loans and loans to indi-

viduals, including those in connection with credit cards, automobiles, and even boats. Banks increasingly favor the steady fee income arising from this securitization process, and they also experience a strengthening in their ratios of capital to assets as these loans are removed from their balance sheets. Bank-originated home mortgages are bundled together and used as backing for marketable debt sold by issuing agencies (mainly the Government National Mortgage Association and the Federal National Mortgage Association) to such investors as mutual bond funds and pension funds. Investors in the asset- and mortgage-backed securities markets—the latter of which has soared to more than $1 trillion—benefit directly from the stream of revenues generated by the interest and principal payments made by borrowers on the underlying individual loans.

In addition, the monetary authorities should rely on the shape of the yield curve to provide insight into whether underlying financial conditions are capable of supporting maximum sustainable growth. For example, the current steep upward-sloping yield curve suggests an abundance of liquidity, reflecting earlier Fed easing moves, together with investor expectations of a future acceleration in price pressures. Conversely, a steeply inverted yield curve (that is, short-term interest rates in excess of longer term interest rates) reflects an acute scarcity of liquidity and declining inflationary expectations.

In sum, the 1990-92 experience began with credit supply constraints and eventually evolved into a prolonged slump in economic activity, accompanied by weakening credit demands. Most striking is the overwhelming power of the credit channel relative to the weaker money supply channel as an influence on economic activity. In the future, the cost and availability of credit is likely to remain the dominant force in the linkage between our financial and real sectors.

On the Non-Neutrality of Money

*by Hyman Minsky**

I. Introduction

A. The paradigm

As Bernanke points out, the dominant microeconomic paradigm is an equilibrium construct in which initial endowments of agents, preference systems, and production relations, along with maximizing behavior, determine relative prices, outputs, and an allocation of outputs to agents. Money and financial interrelations are not relevant to the determination of these equilibrium variables. The dominant macroeconomic paradigm builds upon this microeconomic paradigm, so that "real" factors determine "real" variables.

An implication of these constructs in the dominant microeconomics and the core of the dominant macroeconomics is that money and finance are neutral. The essential problem is whether any macroeconomic theory that is constructed upon a set of assumptions from which the proposition that money and finance are neutral is derived can be a serious guide to understanding our economy and to the development of policies for our economy. For such a theory to be made relevant, it is necessary to add particular auxiliary assumptions, whose effects are assumed transitory, to the core model so that money and finance are not neutral for the time that the transitory factors are operative.

B. The veil of money

In these dominant models money is a veil. Jack Gurley put the standard monetarist model away when he remarked, anent one of Milton Friedman's works, that "money is a veil, but when the veil flutters the economy stutters." Robert Lucas, realizing that money has to be more than a veil for the conclusions he preferred to be acceptable, structured the game that became monetarism Mark 2 by postulating that agents are unable initially to discriminate between own market (relative price) price changes and general market (price level) price changes. He achieved a transitory non-neutrality of money by assuming that in each episode, agents are initially confused, so that some assume one and others the other; but the market rewards those who made the correct choice, and those who made the incorrect choice either lose out in the market or they learn and change their behavior.

C. Private information

Macroeconomic model building since Lucas' day has largely consisted of first accepting that a "real system" determines equilibrium and then inventing *imperfections* in the economic structure, money system, or financial markets so that non-neutrality results. Such a model is New Keynesian if the result is the existence of a number of equilibria that are not necessarily at full employment and if policy is effective. Such a model is New Classical if the result is that a unique real equilibrium exists and if policy is ineffective.

A popular way to generate non-neutrality of monetary or financial factors is to assume that information is asymmetric: that each agent has some private information. Furthermore, each agent knows that the others know something that he does not know, even as he has some informational advantages. Information asymmetry implies that the foresight of each agent is imperfect.

But if the basic microeconomic model is opened to include yesterdays, todays, and tomorrows, then the demonstration that equilibrium exists depends upon assuming that the agents have perfect foresight.[1] This implies that when the economic theorist does microeconomics, the assumption is made that the agents have perfect foresight—a necessary assumption if it is

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[1]Bruno Ingrau and Georgi Israel, *The Invisible Hand* (Cambridge, Mass.: MIT Press, 1990).

to be asserted that there is an equilibrium of the economy. When the theorist puts on his macroeconomics hat, he assumes that the agents have different information about the world. On the one hand, perfect foresight is assumed in order to demonstrate the existence of an equilibrium, and on the other hand, imperfect foresight is assumed under the rubric of asymmetric information (imperfect foresight) to generate the existence of a plausible underemployment equilibrium and the possibility of policy effectiveness.

There seems to be a logical flaw in the asymmetric information argument, for perfect foresight is first postulated to obtain an equilibrium and then repudiated in order to get targeted results. Once it is agreed that macroeconomics studies the course of events in historic time and that information asymmetries are pervasive, significant, and inevitable, then it follows that macroeconomics cannot be constructed on the foundation of equilibrium microeconomics.

D. An alternative paradigm

The conventional economic paradigm is not the only way economic interrelations can be modeled. Every capitalist economy can be described in terms of sets of interrelated balance sheets. Except for two sets of entries—those that allocate the real capital assets of the economy to particular balance sheets (of firms) and those that allocate the net worth of the economy to other particular balance sheets (of households)—every asset is a liability in another balance sheet and every liability is an asset in other balance sheets. Balance sheets balance.

The entries on balance sheets can be read as payment commitments (liabilities) and expected payment receipts (assets), both denominated in a common unit. The essential content of any set of interrelated balance sheets is the payment commitments or expectations (cash flows) that they represent. These payment commitments and expected receipts are demand, dated and contingent.

An economy consists of households, nonfinancial firms, financial institutions, and governments. At every reading of the balance sheet the financial instruments can be interpreted as generating two sets of time series: the liabilities generate payment commitments, and the assets generate expected cash receipts. In addition to the time series of cash flows due to the financial structure, households have a time series of expected cash receipts in the form of wages and transfer payments, and firms have a time series of expected cash receipts due to expected gross sales. The gross sales receipts of firms over a period of time are, in turn, paid out to workers as wages, to suppliers as payments for purchases, to government as taxes, and to the owners as gross profits. Part of the gross profits are retained and the rest paid out as interest, payment of principal on debts, and dividends.[2]

Balance sheet relations link yesterdays, todays, and tomorrows: payment commitments entered in the past lead to cash payments that need to be executed now as well as future cash payments, even as liabilities are taken on now that commit future cash flows. In this structure the real and the financial dimensions of the economy are not separated: there is no so-called real economy whose behavior can be studied by abstracting from financial considerations. Wages and profits earned in current production are in part, in whole, or in more than whole committed to fulfill obligations arising from liabilities, even as the cash received now in exchange for commitments to pay in the future finances portions of the current demand for investment output, consumption output, and government demand. In addition, liabilities are issued when a restructuring of the liabilities of holders of inherited capital takes place; the contractual cash payments from debtors are modified when refinancing takes place.

This system, linking yesterdays, todays, and tomorrows both financially and in terms of the demand for and supply of goods and services, is not a well-behaved linear system. Furthermore, the presumption that this system has an equilibrium cannot be sustained. This modeling of the economy leads to a process in time that generates a path that can fly off to deep depressions and open-ended inflations, even in the absence of exogenous shocks or strange displacements. In this model, money is never neutral.

In *The General Theory* Keynes sought to create a model of the economy in which money is never neutral. He did this by creating a model of the capitalist economy in which the price level of financial and real assets is determined in markets where money is taken as a financial instrument with the special properties 1) that debts are denominated in it and 2) that its price for fulfilling contracts is always 1: that is, money is the asset whose value is derived from its liquidity.

Recall that for Keynes each capital and financial asset yields an income stream, has carrying costs, and possesses some degree of liquidity—that is, it could be transformed at a cost into money: the cost depends upon the nature of the asset and the properties of the market in which it is sold or pledged. The price level of assets is determined by the relative value that units place upon income in the future and liquidity now. Thus the greater the value placed upon liquidity, the lower the price of those assets that are mainly valued for their

[2]This abstracts from timing problems such as wages being paid before cash is received for goods sold.

expected income. Note that any disruption of the market in which a particular asset can be sold or pledged lowers its liquidity and therefore its price.

The price level of current output is determined by the labor costs and the markup per unit of output. As a first approximation, the aggregate markup for consumption goods is determined by the ratio of the wage bill in investment goods, the government's deficit adjusted for purely financial transactions,[3] and the international trade balance to the wage bill in the production of consumption goods. These aggregate relations determine the mass of gross profits. In this construct, the competition of interest is that among firms for profits. In this perspective, output prices carry gross profits—the cash flows that enable firms to meet their payment commitments on their liabilities.

The non-neutrality of money in this version of Keynesian economics is due to the difference in how money enters into the determination of the price level of capital assets and of current output, that is, investment goods and consumption goods in the simplest case. The Keynesian assumptions that lead to the non-neutrality theorem reflect essential aspects of capitalism in that they recognize that capital and nonmonetary financial assets exist and that they not only yield income streams but can also be sold or pledged in order to get control over money. Furthermore, capital assets can be newly produced (investment output), and decisions to order and to produce such new production of capital depend upon the relation between the price level of investment goods, the price level of capital assets, the flows of retained earnings of firms, and the conditions for external finance.[4]

It strikes me that this way of modeling non-neutrality is superior to the asymmetric information way, in which non-neutrality depends upon borrowers being smart and bankers being dumb. While asymmetric or private information is a pervasive fact of life and of decision making in historic time, it is not necessary to non-neutrality, for even if information were symmetric and no private information existed, the prices of capital assets and current output would be determined in quite different markets and the dominant proximate determinants of the two would differ.

Note that this way of modeling capitalism emphasizes decisions to invest and the determinants of the structure of portfolios. The decision makers are at once rational agents and maximizers, but they know that their well-being rests upon the performance of markets that are subject to both evolution and breakdowns. Furthermore, they know that they do not have the gift of perfect foresight. For economics the appropriate question is, How do rational individuals behave in an irrational world, that is, a world they do not fully understand? Rational agents know that they might not know. The assumptions underlying the models of investment and portfolio choice that lead to the Keynesian concept of liquidity preference are that agents recognize their own fallibility and, as a result, that events deviating from what a maintained model indicates as outcomes will lead to revisions in the maintained model that in turn can change behavior. In this way, observations that seem like small impulses can have large impacts. Thus a small increase in the failure of assets to perform can lead to large changes in available financing because the models of the economy that guide the behavior of agents change. An episode of, say, overindebtedness can lead to an increase in the utility derived from the asset whose market value seems secure relative to the utility derived from holding an asset whose income earning capacity is greater but whose market value seems less secure. Such relative prices of assets are in turn inputs in the determination of investment.

II. Balance sheets and cash flows: Robust and fragile financial structures

Every capitalist economy is characterized by a system of borrowing and lending based upon margins of safety. The fundamental borrowing and lending act in this system is an exchange of "money" now for "money" in the future. This exchange takes place in the aftermath of a negotiation in which the borrower demonstrates, to the satisfaction of the lender, that the money of the future part of the contract will be forthcoming. The results of this negotiation, including what happens when the debtor fails to fulfill the commitments to make payments, are stated in a contract. The money in the future is to cover both interest and the repayment of the principal of the contract.

A. Hedge, speculative, and Ponzi finance

For a particular balance sheet, whether it be of a household, nonfinancial firm, bank, other financial institution, or government unit, the liabilities call for payments to be made now or at specified dates in the future or when specified contingencies arise. The assets transform into current and expected receipts. If the assets owned by a unit fail to generate the funds needed to meet the payments on liabilities, then somewhere in the economy there are nonperforming assets.

If, for an economic unit, the current and expected

[3]The government's spending on the resolution of the debacle of the savings and loan associations and on sustaining commercial banks is not part of the deficit for purposes of income and profit determination.

[4]See Hyman P. Minsky, *Stabilizing an Unstable Economy* (New Haven: Yale University Press, 1986); and *John Maynard Keynes* (New York: Columbia University Press, 1975).

flows of funds that result from the normal functioning of the assets it owns (together with the flows of cash due to wages for households) are sufficient to fulfill current and future expected payment commitments due to liabilities, then the unit is in a financing posture that I have labeled hedge. For example, during the heyday of the fixed interest fully amortized mortgage, the monthly payments were, for most such contracts, an allocation of expected wage incomes, which were expected to be sufficient to meet all payment commitments. It should be noted that the paper that the real bills doctrine held to be appropriate for banks restricted bank financing to transactions that corresponded to the definition of hedge financing.

If we consider a partially amortized five-year balloon mortgage, wages can be the expected source of the funds to honor the contract for five years. A refinancing—replacing maturing debts with new debts—is expected to be the source of funds at the end of the five years. Balloon mortgage financing introduces an element of uncertainty in financial relations, in that the terms of the refinancing depend upon market conditions when the refinancing takes place. I have called this type of financing speculative financing.

Speculative financing covers all financing that involves refunding at the market terms that rule at the refunding date. Banks are always engaged in speculative financing. The floating debts of companies and governments are speculative financing arrangements.[5]

If the cash flow of a highly indebted operation—firm, household, government, or financial institution—is less than the interest part of its debts falling due during a relevant period, then new debt must be issued if the interest is in full or in part to be paid. Long ago I labeled such "payment in kind" financing Ponzi finance.[6] If units engaged in speculative financing are confronted with sharply rising interest rates, and if they cannot adjust the income their assets earn to the interest their liabilities carry, then they become Ponzi financing operations. The savings and loan associations were in this position during the high interest rate period of the late 1970s and early 1980s.[7]

[5] I am not certain but I believe that Olympia and York used commercial paper to finance at least part of their holdings of commercial real estate.

[6] I would have been better served if I had labeled the situation "the capitalizing of interest," but the discourse would have lost a colorful description.

[7] There was an implicit contract between the "government" and the savings and loan associations in the financing arrangements for housing that the New Deal introduced: the savings and loan associations would make long-term fixed interest rate mortgages and the "government" would keep the funding rates of the associations within bounds determined by the rates on their long-term assets. The monetarist episode in Federal Reserve policy

For a private operation engaged in Ponzi finance, net worth is debited by the amount that indebtedness increases. Thus the margin of safety provided to lenders by the excess of the book value of assets over indebtedness shrinks. Furthermore, the shortfall of income relative to payment commitments that characterizes a run of Ponzi finance throws the book value of assets into question, lowering market value equity more than book value equity.[8] As equity diminishes, the ability to continue capitalizing interest vanishes: for private units there are limits to Ponzi financing.

Note that construction financing is almost always a prearranged Ponzi financing scheme that is to be validated by the payment on completion, usually by funds derived from a takeout mortgage. Delays in transforming a nonperforming construction asset into a performing real estate asset can be deadly to thin equity projects, which are common during a property boom.

It is worth noting that the current income and expenses posture of the United States can be viewed as a case of Ponzi finance: interest on the public debt accounts for a large measure of the deficit. As long as this goes on, the burden of the debt (current carrying costs) is increasing with no corresponding increase in the nation's productive capacity.

B. Robust and fragile finance

The place of an economy on a financial robustness-fragility scale is determined by 1) the weight of hedge, speculative, and Ponzi finance units in the economy; 2) the willingness and ability of the authorities to refinance units at concessionary terms when current market rates transform units into Ponzi units; and 3) the in-place power of the authorities to sustain aggregate profits (cash flows to business) and aggregate wages when current market rates turn a large number of units into Ponzi financing units and when the flow of profits and wages could slow down (because the failure of financial contracts and real assets to perform leads to a decline in the willingness and the ability of firms to invest and of financial institutions to finance investment activity).

The above is quite general. The special assumption of the financial instability way of looking at the world is that over a run of good times, the structure of units among hedge, speculative, and Ponzi financing changes, so that the weight of hedge financing decreases and the weight of speculative and Ponzi financing increases. This happens because during a

Footnote 7 continued
(whether the monetarism was full-blown or practical) did not acknowledge this implicit contract.

[8] Whether the stock market valuation of a financial firm reflects such a lowering of market to book value equity when it occurs is an open question.

period dominated by hedge financing, the structure of financing terms and the performance of markets and institutions that trade in assets and refinance debts lead profit-seeking clients of banks and markets and the operators of banks and the operators in markets to substitute debt for equity and short-term debts for long-term debts. This substitution operates from both the demand and the supply sides: bankers, both commercial and investment, are liquid or know organizations that are liquid and seek borrowers.

Given a sufficient weight of speculative units, a not abnormal event can lead to an increase in Ponzi financing units and then trigger a debt deflation process. The course of events after the triggering occurs depends upon the strengths of both generalized lender of last resort interventions and the ability of governments to sustain income and employment by running deficits.

The gist of the argument is that the Smithian invisible hand proposition does not necessarily hold in a world where the financial structure has the characteristics of our financial structure. Each agent maximizing income or wealth in such a world may in an unintended way promote the emergence of a situation where an inefficient debt deflation and a deep depression are the outcomes.

C. The determinants of the basic cash flows

I will not repeat here the straightforward Levy-Kalecki formulation of how the structure of aggregate demand determines the distribution of incomes.[9] It is enough to say that in an economy where government-financed demand for labor is a large percentage of the total demand for labor, a collapse of gross national product and the associated aggregate gross profits such as took place in the 1929-33 period cannot occur. This means that the cash flows available to validate financial contracts cannot fall as far as they did in the Great Depression. We need to recall that in the great contraction of 1929-33, nominal GNP fell by 50 percent and the price level fell by one-third, but the indices of stock prices, the Dow Jones and the Standard and Poor's, fell by 85 percent.

A government that is large enough to sustain profits is necessary if we are to have 1) financial markets where freedom to innovate and to finance is the rule and 2) an ability to avoid deep and long depressions. We also need to be able to swing from periods in which the private economy dominates in the determination of gross profits and periods in which public debt-financed spending takes over the burden of sustaining gross profits.

[9]Michael Kalecki, *Selected Essays on the Dynamics of the Capitalist Economy (1933-1970)* (Cambridge: Cambridge University Press, 1971); S. Jay and David Levy, *Profits and the Future of American Society* (New York: Harper & Row, 1983).

III. The dog that didn't bark

The main problem that the experience of the past several years poses for the endogenous instability view is that the thrust toward a deep depression was contained. The so-called bailout of the savings and loan associations and the banks, together with the huge government deficit, explains how that happened.

In an earlier work, Bernanke concluded that the taking out of much of the financial institutional world—the destruction of banks, building and loan associations, and brokerage houses—delayed the recovery from the great contraction.[10] On the basis of our current understanding, which owes much to Bernanke, the stagnation hypothesis of A.Hansen and R. A. Gordon should be reconsidered.[11] The Hansen-Gordon version of the stagnation hypothesis held that an exhaustion of investment opportunities was responsible for the protracted stagnation or the incomplete recovery from the bottom of the Great Depression (1933) until the beginning of rearmament (1939). The alternative version of the stagnation hypothesis holds that stagnation occurred because the financial system was smashed in 1929-33 and therefore there was no system in place that could translate improved profit prospects into financed investment.

If we think of "normal prosperity" as being powered by private demands, arguably the great stagnation lasted through the Second World War and beyond. Prosperity led by private demand did not reappear until after the demobilization from the war was completed. Furthermore, the initial conditions for postwar prosperity included households, nonfinancial businesses, and banks and other financial institutions that were extraordinarily rich and liquid, a government that was a much larger percentage of GDP than any prior peacetime government, and a system of regulated and guaranteed financial institutions. Because of the depth of the depression and the drain of resources to war, the great contraction and the ensuing absence of a private demand-driven prosperity may have lasted sixteen or more years, from 1929 though 1946 or 1947.

Our current situation is similar to that of the Great Depression-stagnation period in that we have had a

[10]Ben Bernanke, "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," *American Economic Review*, June 1983, pp. 257-76.

[11]Alvin H. Hansen, "Economic Progress and Declining Population Growth," *American Economic Review*, vol. 29, no. 1 (March 1939), rpt. in Committee of the American Economic Association, ed., *Readings in Business Cycle Theory* (Philadelphia: Blackiston and Co., 1944), pp. 366-84; Robert Aaron Gordon, *Business Fluctuations*, 2d ed. (New York: Harper, 1961).

period during which financial institutions in large number have either been hurt or disappeared. Deposit insurance prevented the losses on asset values of savings and loan associations and banks from passing through to depositors. In this, our recent bout of instability was unlike the Great Depression. The way the intervention that prevented the pass-through was carried out, however, has resulted in a decrease in the number of independent financing sources as well as an increase in the size of the surviving institutions. The consolidation of banks into larger units is continuing because of the relaxation of the regulatory barriers to interstate banking and to combining various "banking" functions in one unit.

There always has been a conflict between those who see banks as the operators of a safe and secure payments mechanism and those who see banks as an essential institution for the capital development of the economy. The first group views banking and financial intermediation as essentially passive processes by which a predetermined amount of savings is allocated among alternative uses. The second group views banking and financial intermediation as active agents in the economy that, by financing investment, force resources to be used to put investment in place, thereby fostering the development of the economy.[12]

This forcing of investment determines income. Income achieves that level at which savings and investment are equal. Keynes treated the forcing as a generalized income increase. Kalecki et al. treated the forcing as operating through income distribution as well as through a generalized rise in income.

From this second point of view, the financial trauma of the past several years has erected a barrier to our achieving a close approximation to full employment as a result of private debt-financed demand for some time in the future. Furthermore, in the 1930s as well as in our recent and continuing experience, major firms have suffered major losses. The bankruptcy and near-bankruptcy of major firms in the past several years are reminiscent of what happened to the blue chip railroads in the 1930s.

Both the 1930s and the current situation began as Fisher had the debt deflation begin: the initial position is what Fisher called over-indebtedness, and what I call heavily indebted.[13] In Fisher's time the debt deflation was not contained: neither the ideas that rationalize containment nor the tools for containment were in place. The ideas are those that follow from Keynes' *General Theory*; the tools are a central bank free from the fetishes of the gold standard and governments throughout the world that spend 20 percent or more of their full employment GDP.

One conclusion that follows from this institutional interpretation of the stagnation of the 1930s and our time is that tax initiatives that look to inducing investment—for example, an investment tax credit—will not have the kick in the 1990s that they might have had in the 1960s, when the financial system was much more robust than it is now.

To return to Bernanke's paper: There is much to praise in the exposition of the asymmetric information boomlet. The asymmetric information approach is more serious than the New Classical approach in that it recognizes the importance of the institutional structure. However, the asymmetric information approach stops short of modeling the financial relations of a capitalist economy and therefore seemingly bypasses the two-price-level characterization of a capitalist economy. It is the two price levels and the difference in the information that determines their behavior that make non-neutrality an unavoidable attribute of capitalist economies.

[12]The Jackson-Biddle conflict over the Second Bank of the United States was largely a conflict between the view of banking as an engine of development and the view of banking as the provider of a safe and secure payment mechanism.

[13]Irving Fisher, "The Debt-Deflation Theory of Great Depressions," *Econometrica*, October 1933, pp. 337-57.

Credit Veils and Credit Realities

*by William Poole**

Ben Bernanke's paper has given me an opportunity to dig into a line of literature I had not followed closely. I had always felt that credit views of the business cycle were misleading because they confused surface appearances with underlying economic forces. Moreover, separating real and credit effects is difficult, even conceptually, because spending by economic units is subject to a budget constraint. Given income, for example, a decrease in a household's purchases of goods is the same thing as a decrease in its net sales of financial assets.

I learned a lot from reading Ben's paper, but when I finished it I felt that I had little understanding of the implications of credit for the business cycle. To my taste, Ben makes too many references to what "may" or "might" happen and not enough to what is likely to happen. I won't claim that credit effects are literally zero, but I would like to see at least some back-of-the-envelope calculations indicating how important these effects might be. Also, I need to make the argument simpler and more abstract to zero in on the essential elements.

My ruminations start with the gains from using money over barter. These efficiency gains are so great that even primitive economies use money. Every economy has established monetary conventions and institutions that people employ every day but do not really understand. Money is like the operating system on my computer. When the system crashes, most useful work stops. I can still do a little with pencil and paper, but not very much.

After World War II, disruptions to the payments system had little or nothing to do with the business cycle in the United States or other countries belonging to the Organization for Economic Cooperation and Development. I can relate this observation to Ben's discussion of evidence on the effects of banking panics. I think his argument is sound; a banking panic has effects that are larger than those flowing from the decline in the quantity of money per se. When payments cannot be reliably made or received, sellers of goods do not want to part with goods for money, or what had worked as money before the panic. Potential buyers find that what had worked as money is less useful than before in purchasing goods. Sudden destruction of confidence in an economy's money has effects like throwing sand in machinery. Restoring or replacing a monetary system is not an easy task, and output falls until the monetary system begins to function reliably once again.

My interpretation of Ben's argument is that credit effects work something like these monetary effects. To analyze credit effects, let's start at the beginning. A consumer's optimization problem is to maximize expected utility subject to a budget constraint. The utility function has as arguments consumption in the current period and all future periods over the relevant horizon, which I'll assume for present purposes is the consumer's lifetime. The budget constraint is that the present value of outlays cannot exceed the sum of beginning wealth and the present value of expected future income receipts from all sources. This simple picture will do for present purposes. Firms face a similar problem; I'll assume that the objective is to construct an investment plan that maximizes the present value of the firm. This value depends on households because they are the ultimate wealth holders and their behavior determines the prices of securities issued by firms.

The solution to any given agent's optimization problem may yield current outlays for goods that are either above or below current income receipts. The credit markets permit deficit units to borrow from surplus units, to the benefit of both. Just as money is extraordinarily efficient relative to barter, so also is the use of credit relative to an economy in which each economic unit is constrained to a flow of outlays matching its flow of income receipts. In real terms, an economy's saving

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can only take the form of investment in physical capital. A frontier farm, in which the consumption and production units are the same, can save by investing labor in clearing land, for example. But when firms and households are separate units, household saving requires that the household accumulate claims on firms; capital flows from households to firms are unavoidable. Ben is right to emphasize the importance of the recent literature exploring these issues for deepening our understanding of resource allocation and economic growth. But the role of credit markets in the business cycle is a different matter.

How do we separate credit disturbances from real disturbances? If firms decide to invest less, they are simultaneously deciding to raise less financial capital. The IS-LM model treats the financial market as the redundant market. However, the model would work in the same way if it excluded the goods market and kept the financial market. Behavior in the goods market, such as investment demand, is simultaneously behavior in the financial market.

Consider the credit controls in 1980. These were called "credit controls," but most of the effects came not from controls per se but from a voluntary consumer response to reduce spending. If President Carter had simply appealed to consumers to reduce their spending and the response had been the same, then there would be no issue about how to categorize what happened. A downward shift in the consumption function simultaneously reduced demand for consumer credit. What really drove this situation was consumer behavior in the goods market. The credit controls were too weak to have any real effect; if consumers had wanted to ignore them they could have.

Even when credit market interventions have undeniable effects on particular agents, the macro effects are often unclear. Reduced credit availability for some borrowers releases credit for other borrowers. The net effect on spending in the goods market is smaller than the identified effect on particular borrowers. I am usually suspicious of claims for macro effects of credit problems because the identifiable effects are usually obvious whereas the offsets are typically diffuse, small for any one agent, and difficult to identify. But in the aggregate these small effects may add up to offset completely the identifiable negative effects.

Consider an artificial example that illustrates a "pure" credit market disturbance. Suppose the government, in its wisdom, were to declare that all outstanding debts of those with the last name "Poole" were canceled, effective immediately. Poole families enjoy a windfall gain in wealth; they recalculate their optimal consumption plans and presumably raise current outlays. Poole creditors suffer losses; they recalculate their optimal consumption plans and presumably reduce current outlays. The effect on aggregate consumption in this period depends on the consumption behavior of Pooles versus Poole creditors; economists usually assume that these distribution effects are small or zero.

A credit disturbance of this kind has no substantial aggregate effect. A model that ignores the financial sector yields the right answer in this case. The financial claims within the economy net out to zero. What is important is the inheritance of physical wealth and the implications for current spending of the optimizing plans of the economy's firms and households. The credit markets are essential to permitting the economy to realize its plans, but not to understanding how these plans change over time and how those changes relate to the business cycle.

I think that hypothesized credit market effects are often simply one side of a wealth redistribution. Ben refers to balance sheet improvements arising from lower interest rates. Assuming floating rate or callable debt, lower interest rates reduce debtors' flow of interest payments. However, creditors have a reduced flow of interest income. Ben focuses on reduced interest payments; television news stories focus on retired people living in Florida whose interest income has declined. I focus on both and call it a wash, as a first approximation.

I am yet to be convinced that recent problems in the banking industry are anything more than one side of a redistribution that has little macro effect. Bank loan growth has been sluggish, and banks have not been aggressive in selling certificates of deposit (CDs) to finance bank credit expansion. Where have the funds gone that under other circumstances would have been placed in CDs and intermediated as bank credit? Perhaps through a chain of substitutions, the funds have gone to venture capital, or into the initial public offering market, or a zillion other places. It simply isn't obvious to me that creditworthy borrowers have been unable to find capital. Much of the complaining has come from the real estate industry, but I think we should be pleased that our credit markets have cut back credit for this industry. Indeed, the puzzle is why the cuts didn't come sooner following the Tax Reform Act of 1986 and the evident accumulation of excess capacity in commercial real estate.

Let me now extend my Poole-debt illustration. Suppose this government action led to widespread fear that *all* debt claims, past and present, would be canceled. The previous optimizing behavior of households and firms would no longer be possible. The effect on the economy would be similar to that discussed earlier in the context of a monetary disruption that destroyed confidence in money. Surplus units would presumably

spend more on goods than otherwise and accumulate money and equity claims in lieu of debt. Deficit units would be compelled to bring outlays in line with current receipts unless they could be financed with equity. Households, though, can't sell equity in themselves. Without question, aggregate output would fall substantially. The issue is whether disruptions of this kind play any significant role in the business cycles we observe.

I think the answer is probably "yes" in the context of severe cycles of the type Irving Fisher discussed in his debt-deflation theory. By 1933, private credits in general had become highly suspect because potential buyers of private credits doubted that they could be repaid. As Fisher emphasized, the risk premium rose substantially, so that the real rate of interest on private credits became prohibitively high for many or even most private borrowers. The normal process of credit flows from surplus units to deficit units was severely disrupted.

Can these effects be analyzed within a model that ignores the credit markets? Consider a representative agent that is a combination firm-household in a model without a credit market. The agent reduces purchases of new capital goods because of a decline in the prospective real yield from new investment and/or an increase in uncertainty over the yield. These are the same conditions that in the credit markets make it difficult for firms to issue bonds to finance new investment. Given that money is still in the model, agents must be concerned with the future price level because holding more money instead of more physical capital is an option.

What is really driving behavior in the goods market in this case is reassessment of the expected future income stream that is so important in determining current behavior through the mechanism of the intertemporal budget constraint. Fisher's debt-deflation argument and Keynes both emphasized the importance of expectations about the future. The other paper in this conference, by Cantor and Wenninger, also emphasizes changes in expectations, especially with respect to inflation. Ben says essentially nothing about expectations.

Ben does not, it seems to me, draw a sharp enough distinction between the role of new credit and inherited credit. He emphasizes that outstanding credit may affect firm performance and productivity, but also that any such effects must be distinguished from business cycle effects. He argues that a heavily indebted economy is less stable, but I think his analysis of the redistribution from debtors to creditors is incomplete.

I believe that prospective defaults have macro implications precisely because they are *not* simple redistributions. Creditors are obviously poorer as debt declines in market value because investors raise their estimates of probability of default. Debtors, however, do not believe that they are better off to the same degree, because they want to avoid default. With bankruptcy, debtors lose control of the physical capital they own; they also lose reputation and suffer reduced opportunity to borrow in the credit markets in the future. Debtors view their debt as the original nominal obligation and not as the obligation depreciated by fear of default. As Fisher emphasized, debtors trying to save themselves accelerate the decline in the price level as they sell off goods to raise funds to service debt. For the economy as a whole, however, the decline in the price level makes the debt-deflation problem worse.

The effects of unanticipated inflation are not symmetrical with those of unanticipated deflation. Unanticipated inflation may reduce the risk of default slightly by decreasing the real burden of debt, but the primary effect is the redistribution of wealth from creditors to debtors. However, macro effects may arise from this redistribution because firms are net debtors and the business of firms is entrepreneurship and risk-taking. Thus, with a rising price level depreciating the real value of outstanding debt, wealth is systematically transferred from more to less risk-averse agents. Firms can readily finance new investment, and firm managers are disposed to do so.

Ben's analysis, and my own ruminations, have convinced me that the propagation of monetary effects depends on the amount of credit outstanding. However, the essential features of the story arise from *unanticipated* changes in the price level. Inflation and inflation instability affect the economy in many subtle ways. Business practices change when inflation is persistently rising, and change again, as Karen Horn reminded us this morning, when inflation is persistently declining. In sum, I think it is hard to tell a convincing story that in practice large credit effects per se contribute significantly to business cycle fluctuations. The cycle is driven, I believe, by inflation surprises and revisions in expectations about future income streams.

Official Surveillance and Oversight of the Government Securities Market

by William J. McDonough

Mr. Chairman and members of the Subcommittee, I am pleased to have the opportunity to appear before you in my capacity as Executive Vice President of the Federal Reserve Bank of New York responsible for the Financial Markets Group. As such, I have responsibility for Domestic and Foreign Operations of the System Open Market Account and for the recently formed Market Surveillance Function. My statement this morning will discuss the market surveillance activities of the Federal Reserve Bank of New York and the overall subject of the official oversight and regulation of the Government securities market.

We all share a common goal regarding the government securities market. That is, we all want to ensure that the integrity, health, and efficiency of the world's largest and most liquid securities market is preserved. Quite clearly, the American public and the world at large share an enormous interest in the continued vitality of the market for U.S. Treasury securities and its ability to meet both public and private needs.

Against this background, the immediate question before the Subcommittee centers on how the legislative process can best support efforts to ensure that this vital market retains its status as the most efficient market in the world. As the Subcommittee deliberates this important topic, I think it necessary to consider the strides taken over the last year to improve the monitoring of this market.

Salomon Brothers' admissions of deliberate and repeated violations of Treasury auction rules could well have damaged the public's confidence in the overall soundness of the government securities market. Fortunately, this did not happen, as evidenced by the efficiency with which the market has continued to perform. Nonetheless, some important questions were raised about the workings of that market and the official oversight of the market.

Following the events of August 1991, the Treasury, the Securities and Exchange Commission, and the Federal Reserve moved quickly to address the various concerns that arose from the Salomon revelations. The agencies have set up a working group on market surveillance, with the Federal Reserve Bank of New York accepting primary responsibility for collecting and disseminating information. The Treasury facilitated broader auction participation, clarified and restated auction rules, and, with the Federal Reserve, strengthened the procedures for enforcement of those rules. Changes were made to the administration of the primary dealer system to provide greater access to participants who wished to service the central bank.

Ongoing automation initiatives will lend further support to ensuring that the primary and secondary markets are open and accessible. Our new system for automated Treasury auctions is in the final stages of testing and its implementation is scheduled for next month. This effort will speed and further systematize the auction review process and further allow for broader bidder access. In addition, we have finalized many of the business requirements for the automation of our open market operations and have taken some initial steps in development, with a view toward implementing

Statement by William J. McDonough, Executive Vice President of the Federal Reserve Bank of New York, before the Subcommittee on Telecommunications and Finance of the House Committee on Energy and Commerce, March 17, 1993.

a number of capabilities next year. This effort will provide an efficient way of accommodating an expansion in the number of our trading counterparties—should such occur.

Market participants themselves have reviewed and improved internal compliance procedures and audits following the revelations of wrongdoing in 1991. Finally, it is important to restate that in the face of apparent irregularities in the marketplace, securities and bank regulators *already have access* to individual dealer firms' books, records and trading systems. Having said that, I should also stress that it is neither possible nor desirable to have absolutely failsafe management and control systems or regulatory schemes that can prevent or detect every problem or potential problem. Nor is it desirable to discourage innovation with overly restrictive and duplicative rules. What is needed is an approach that strikes an appropriate balance between the efficiency of the market and adequate regulatory oversight.

Of the efforts taken to date, I should comment on the significant progress made in improving communications among the agencies involved in the surveillance effort—the Bank, the Treasury, the Securities and Exchange Commission, the Federal Reserve Board, and the Commodities Futures Trading Commission. The entire working group holds a biweekly conference call, and senior officials of the working group meet quarterly. I can assure you that the progress made in cooperation and information sharing will certainly continue. And I can also assure you that there has been no facet of the work of the interagency group to date that has witnessed material differences of opinion or judgment among the various agencies.

In its effort to satisfy the needs of the working group, the New York Fed's surveillance work has focused on activity surrounding a number of specific Treasury securities, as well as a variety of overall market conditions. Additional attention was devoted to those incidents that, based on comparisons with either historical experience or then-existing market conditions, were a potential source of concern. Needless to say, our methods are being refined as we gain more experience and receive input from the other agencies.

In the interest of time, I will not cover the full scope of our efforts. However, allow me to mention briefly a few of the specifics of market surveillance. We look at price movements, yield spreads, and trading volume in the cash market. In the financing market, we review market quotes and trades for overnight contracts and term maturities. From individual primary dealers, we collect aggregate data on positions, transactions, financing, trade settlement, and when-issued activity in specific securities. We also receive information on individual securities when we undertake a formal survey of primary dealers' activity.

More broadly, we have access to market opinion, analytics, general economic data, and specific information on other, related markets. Finally, our daily conversations with the market participants themselves provide invaluable information on market developments and participants' own trading activity. This wealth of information allows us to evaluate the current behavior of specific securities of interest from the vantage point of a comprehensive view of the market. We share with the members of the interagency working group all significant market information that we collect.

Our surveillance efforts over this past year focused on apparent shortages of specific Treasury securities. Time and again, we found that individual episodes of "specials" trading represented the natural consequence of legitimate uses of the Treasury market, especially in connection with risk-management strategies to facilitate the orderly underwriting, issuance, and distribution of the full range of fixed-income securities sold by corporations, state and local governments, and others. At times, these activities can generate large amounts of short positions in Treasury securities as underwriters hedge their exposures. As a consequence, temporary shortages of certain issues can and will develop even though there is a large amount of securities outstanding.

Despite the general thrust of our findings to date, we recognize that we must continue to pursue each incident of unusual market activity rigorously. To meet this responsibility, we intend to build upon the strong start we have made in tightening surveillance. We will continue to improve our knowledge of market developments, our methods of review and analysis, and the technical resources we need to operate efficiently and effectively with a view to servicing the needs of the other members of the interagency working group.

At the same time, I believe Congress can provide some further support for our efforts by reauthorizing the Treasury's rulemaking authority under the Government Securities Act of 1986 and explicitly incorporating the making of misleading statements to an issuer of government securities as a violation of the Securities Exchange Act of 1934. In addition, the Federal Reserve Bank of New York is sympathetic to legislation that would give the Treasury backup authority to require holders of large positions in Treasury securities to report this information. This measure will further our efforts to develop a comprehensive view of the market.

With these steps—and our continued surveillance efforts—I think we come much closer to striking that appropriate balance I spoke of earlier between providing effective oversight by the agencies and avoiding the burdens of excessive regulation that can easily stifle the

efficiency and liquidity of the market, a potentially significant cost that ultimately will be borne by the American taxpayer. The progress we have made so far and the outlook for our near-term initiatives make any additional measures seem clearly premature. The agencies have the ability to review, analyze, and act appropriately—and in a timely fashion—when market developments raise issues of public concern.

Thank you, Mr. Chairman.

Monetary Policy and Open Market Operations during 1992

Overview

During 1992, monetary policy was directed toward promoting and extending the economic recovery that had begun the previous year and toward achieving a further moderation of inflationary pressures. Following a series of moves to ease reserve pressures in the second half of 1991, policy in 1992 was initially placed on hold. A burst of growth in the monetary aggregates and in consumer outlays early in the year suggested that the basis for a solid economic recovery might be in place. Nonetheless, because economic prospects remained uncertain, the Federal Open Market Committee eased reserve pressures slightly in April when it observed a fallback in the broader monetary aggregates and signs of a weakening economic expansion. Two further easing steps were implemented over the summer as evidence accumulated that the recovery was losing momentum. A move in July was associated with a ½ percentage point cut in the discount rate to 3 percent. Over the last several months of the year, labor market and other economic indicators showed renewed strength. In these circumstances, and with price data pointing to a continued trend to lower inflation, the Committee left monetary policy unchanged.

Adapted from a report submitted to the Federal Open Market Committee by William J. McDonough, Executive Vice President of the Bank and Manager of the System Open Market Account. Spence Hilton, Senior Economist, Open Market Analysis Division, and Peter Kretzmer, 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, and Melanie Hardy. Sangkyun Park, Economist, Domestic Financial Markets Division, also assisted.

The three moves to reduce reserve pressures induced a 1 percentage point reduction in the federal funds rate and contributed to a modest decline in other short-term interest rates during the year. Yields on short-term fixed-income securities fell in line with the funds rate during the middle of the year, but then rose in the final quarter as the expansion strengthened and as expectations of further monetary policy accommodation diminished. Meanwhile, longer term rates moved up early in the year, fell at midyear, and then rose again in advance of the presidential election. These yields moderated once more after the election, ending the year about where they began. Although long-term rates were supported by encouraging inflation statistics, uneasiness about future inflation lingered and sometimes impeded rate declines. Particularly during the election campaign, anxieties concerning the implications for federal budget deficits of possible future fiscal stimulus measures helped to lift longer term rates.

Declining short-term interest rates, a steep yield curve, and heavy mortgage refinancing activity stimulated rapid growth in M1 deposits during 1992. In contrast, the broader monetary aggregates increased only very slowly, with both M2 and M3 ending the year below the bottom of their annual growth ranges. The weakness was associated to an important extent with the continuing efforts of households to move funds out of depository institutions and into market instruments offering more attractive returns. At the same time, weak loan demand was discouraging banks from competing actively for time deposits.

Financial strains in major sectors of the economy generally eased during 1992, assisted by declining

interest rates, economic expansion, and increased equity issuance. Falling short-term interest rates facilitated a widening of bank profit margins and, through the refinancing of outstanding debt, helped to reduce debt service burdens on households, businesses, and municipalities. The improving domestic economy helped to increase business profitability, and heavy equity issuance also strengthened the balance sheets of banks and nonfinancial businesses. Financial strains in Japan and Europe at times raised concerns but generally had only a marginal impact on U.S. financial markets.

In implementing the monetary policy directives of the Federal Open Market Committee (FOMC), the Open Market Trading Desk continued to formulate its objectives for reserves by specifying an allowance for adjustment and seasonal borrowing from the discount window that was believed to be consistent with an expected range of federal funds trading. The volume of adjustment credit continued to be restrained by the ongoing reluctance of many depository institutions to tap the discount facility and by generally narrow spreads between the federal funds rate and the discount rate. As a result, adjustment borrowing typically hovered around exceptionally low levels, although it occasionally jumped when shortages of reserves in the market or temporary disruptions to normal payment flows forced depositories to turn to the window to meet reserve requirements or avoid overdrafts in their accounts with the Federal Reserve. In addition, a shift in seasonal credit pricing procedures from the basic discount rate to a market-related rate, effective in early January, contributed to a low level of seasonal borrowing in 1992. Against this background, the Desk continued to view its allowance for borrowing very flexibly.

In April, the Federal Reserve implemented a cut in reserve requirement ratios on transactions deposits to 10 percent from 12 percent. In planning for the change, efforts were made to ensure that reserve management would proceed smoothly. The change was announced in February, well before it took effect, giving depository institutions time to prepare for it. In addition, the implementation was timed to coincide with a seasonal peak in the level of required reserves. Other developments in 1991 and 1992 raised reserve balances and offset some of the reduction from cuts in reserve requirements. Banks substantially increased their required clearing balances (described in the final section), and rapid growth in the components of the money supply subject to reserve requirements significantly lifted the level of required reserves.

Nonetheless, the reserve requirement cuts of the past two years left reserve levels at the Fed in 1992 considerably below their 1990 levels. Many depositories responded to this environment of lower reserve balances by holding fewer reserves early in a maintenance period to avoid accumulating an excess position that could be difficult to work off later without risking end-of-day overdrafts. This behavior contributed to a tendency towards softness in the funds rate early in a maintenance period, even when large reserve deficiencies existed. Even now, the smooth functioning of banks' payment operations remains susceptible to developments that would further reduce the level of reserve balances held at the Fed.

As in the preceding year, the federal funds rate and reserve estimates frequently gave conflicting signals about reserve availability. Some of these discrepancies resulted from market expectations of possible easings in monetary policy. Other conflicts arose from substantial misses in reserve projections (either by the Desk or by banks), or from some banks' efforts to concentrate their reserve holdings late in a period to avoid finishing with unusable excess reserves. With the funds rate widely viewed as a key monetary policy indicator and expectations of a possible easing in policy often running high, the Desk took account of these discrepancies in formulating its reserve operations. To minimize the possibility that the Fed's current policy stance would be misconstrued, the Desk sometimes waited until late in a period to address sizable reserve deficiencies; it even absorbed reserves in a few instances despite estimates showing a shortage. As a result, the Desk occasionally had to arrange very large repurchase agreement (RP) operations late in a period when demands for reserves eventually showed through. Toward the end of the year, expectations of further policy easings faded, and the Desk, in formulating operations, was able to take somewhat greater account of its reserve estimates when discrepancies arose between these estimates and the funds rate. It used these opportunities to reestablish a degree of tolerance, eroded in preceding years, for deviations in the funds rate from the expected level.

The setting for policy

The economy

The economic recovery that had begun in the spring of 1991 continued through 1992, although growth was uneven over the year. The pace of the expansion picked up somewhat in the early months of the year following very low growth in the fourth quarter of 1991 (Chart 1). The economy grew at a 2.9 percent annual rate during the first quarter, the highest rate in more than three years, encouraging expectations that the expansion was gaining momentum. Most of the strength came from an acceleration in consumer expenditures, with lower mortgage rates also leading to faster growth of residential construction activity. Inventories fell during the quarter

as the increase in spending was accompanied by a decline in industrial production (Table 1).

The expansion faltered during the second quarter, with GDP increasing at only a 1.5 percent annual rate. Consumer spending was about flat for the quarter, with expenditures on durable goods declining after their double-digit increase in the first quarter. Net exports also fell as imports grew strongly and as continued weak demand from abroad constrained exports. Although industrial production rebounded during the quarter, the labor market softened. The June employment report was particularly weak, and it was accompanied by a large jump in the unemployment rate (Chart 2).

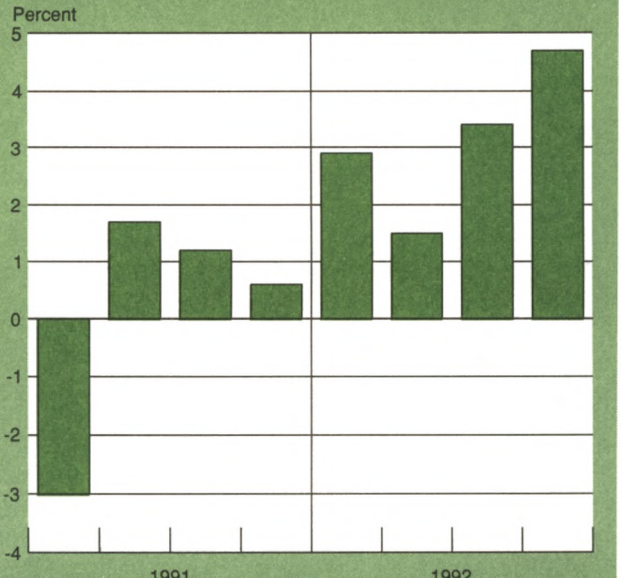
The economy grew more rapidly in the third quarter, with real GDP rising at a 3.4 percent annual rate, although much of the economic data reported during the quarter had suggested a more sluggish performance. The strength came from all major categories of consumer spending, particularly the volatile durable expenditures component. The evident areas of lingering weakness included industrial production, which advanced rather slowly, and the labor market. Although the unemployment rate declined somewhat over the quarter, labor market conditions continued to look rather soft when assessed in terms of the proportion of the working age population with jobs (Chart 2). And despite the strong spending numbers, consumer confidence measures also fell during the quarter (Chart 3), again calling into question the sustainability of the expansion.

In the fourth quarter, the economy grew rapidly, with real GDP increasing at a 4.7 percent annual rate. Consumer confidence measures advanced strongly as the resolution of the uncertainty surrounding the presidential election contributed to an improving national mood. Retail sales expanded briskly in October, and the holiday shopping season was stronger than it had been in several years. The employment numbers also showed some strength during the last two months of the year.

Chart 1

Real Gross Domestic Product

Annualized Rates of Change



Note: GDP is measured in 1987 dollars.

Inflation

Progress in reducing inflation continued in 1992, in part reflecting the benefits of past monetary policy efforts. Persistent softness in the labor market and the uneven pace of recovery contributed to restrained wage and price pressures. While large swings in energy prices, related to the Iraqi invasion of Kuwait, had a big influence on price indexes in 1990 and 1991, this factor was less important during 1992. The core components of both the consumer price index (CPI) and the producer price index (PPI), which exclude food and energy prices, suggested a drop in underlying inflation; the annual rates of increase in the core CPI and PPI fell to 3.4 and 1.8 percent in 1992, from 4.5 and 3.1 percent, respectively, in 1991 (Table 2). Progress was especially visible in the second half of the year when the PPI rose at an annual rate of less than 1 percent.

Monetary aggregates

The broader monetary aggregates crept upward during 1992. After advancing at close to expected rates in the first quarter, both M2 and M3 grew considerably more slowly over the rest of the year, even declining at times, and finished the year below their respective annual growth ranges (Chart 4).[1] In contrast, M1 grew very rapidly over the year. From the fourth quarter of 1991 to the fourth quarter of 1992, M1 grew 14.2 percent, M2 advanced 2.1 percent, and M3 increased 0.5 percent.[2]

[1]The FOMC also establishes a monitoring range for the growth of domestic nonfinancial debt. From the fourth quarter of 1991 to the fourth quarter of 1992, this aggregate grew 4.6 percent (as of February 11, 1993). It was revised subsequently to 4.9 percent (as of April 8, 1993).

[2]Data on the monetary aggregates are as of January 28, 1993. These data do not incorporate the annual benchmark and seasonal factor revisions of February 4, 1993, or subsequent revisions because the earlier data more closely approximate the information that the Committee had available when it was making its decisions. Net revisions through April 8, 1993, lifted M1 growth by 0.1

The opportunity cost of holding M1 deposits decreased substantially over the middle part of the year because rates on checkable deposits fell to a lesser degree than yields on short-term market instruments. A lower opportunity cost explains some of the strong growth recorded for the narrow aggregate. Lower mortgage rates in late 1991 and again during the spring and summer of 1992 spurred a high volume of mortgage refinancing during the subsequent quarters. There is a strong link between the volume of mortgage refinancing and demand deposit growth because the servicers of refinanced mortgages typically hold the prepayments in demand deposits before disbursing the funds to the owners of mortgage-backed securities. Currency grew moderately over most of 1992, with more rapid growth in the third quarter as demand from abroad picked up temporarily.

Growth in the broader aggregates was restrained in 1992, as it had been in the previous year.[3] Both the

Footnote 2 continued
percentage point and depressed M2 and M3 growth by 0.3 percentage point and 0.2 percentage point, respectively. The revisions also redistributed some of the growth in all of the aggregates from the first and fourth quarters to the second and third quarters.

[3]Much of the discussion of the weakness of the broader aggregates is drawn from Joshua N. Feinman and Richard D. Porter, "The

Table 1

Real Gross Domestic Product and Its Components

Seasonally Adjusted Annual Rates of Change, Except as Noted

	1991-IV	1992				1990-IV to 1991-IV	1991-IV to 1992-IV
		I	II	III	IV		
Real GDP	0.6	2.9	1.5	3.4	4.7	0.1	3.1
Consumption	−0.3	5.1	−0.1	3.7	5.1	0.0	3.4
Durables	−3.1	16.5	−2.1	9.4	14.0	−2.5	9.2
Nondurables	−3.5	5.5	−1.5	2.5	6.8	−1.5	3.3
Services	2.3	2.2	1.2	3.1	2.1	1.6	2.2
Fixed investment	−1.2	7.4	15.2	2.3	13.8	−5.3	9.6
Producer durables	−2.4	3.2	24.1	9.5	14.5	−3.5	12.6
Nonresidential construction	−11.5	2.7	−0.8	−11.3	−1.9	−14.3	−3.0
Residential construction	11.3	20.1	12.6	0.2	25.1	−0.1	14.1
Change in inventories (billions of 1987 dollars)	7.5	−12.6	7.8	15.0	9.8	−37.4	20.0
Change in net exports (billions of 1987 dollars)	11.1	−1.0	−22.4	−8.8	3.7	12.2	−28.5
Exports	17.2	4.0	−2.0	12.5	12.4	38.8	26.9
Imports	6.0	5.0	20.5	21.3	8.7	26.5	55.5
Government purchases	−3.0	1.7	−1.2	3.8	−2.6	−0.6	0.4
Real GNP	0.4	3.6	0.7	3.9	4.1	−0.3	3.0
Addenda							
Index of industrial production	−0.7	−3.1	5.2	2.3	4.3	−0.5	2.2
Change in nonfarm payroll employment (thousands)	−56	−46	285	93	131	−1,118	463
Civilian unemployment rate (level)	7.0	7.2	7.5	7.6	7.3	1.0†	0.3†

Note: Data are as of April 12, 1993.
†Change in rate.

nontransaction component of M2 and the non-M2 portion of M3 fell quite steadily throughout the year, declining in all months but one. Several influences combined to reduce the growth rate of the depository sector and hence the broader aggregates. One important contributing factor was the increased public awareness of bond and equity funds and other alternatives to bank and thrift deposits. Because interest rates on longer maturity assets remained high relative to returns on bank deposits, these alternatives became increasingly attractive.

In addition, the continuing reductions in indebtedness by both households and nonfinancial corporations discouraged growth in the broader aggregates. Some firms raised funds directly in the capital market instead of depending on bank credit. Households also lowered their demand for new credit and refinanced existing debt, which banks and other intermediaries increasingly securitized. Furthermore, depository institutions increased the spreads between consumer loan rates and time deposit rates in recent years. After-tax spreads rose further as a result of the phaseout of the interest deductibility of consumer borrowing between 1986 and 1991. The wider spreads encouraged households to reduce their levels of bank loans and discouraged the accumulation of deposits. These balance sheet developments contributed to the downsizing of the depository sector.

Another factor may have been a declining willingness to lend on the part of the financial institutions, resulting from legislation passed both to deal with the troubles of the thrift industry and to strengthen the banking industry. Financial institutions now face stiffer capital requirements, higher deposit insurance premiums, and more stringent lending standards, all of which drive up the cost of depository intermediation and lead to reduced growth in the depository sector.

Financial and business developments

Yield movements. Short-term interest rates fell during 1992, while for the most part, yields on securities maturing in three or more years ended the year about where they had started (Chart 5). Early in the year, short-term rates were steady, while longer term yields moved higher amid signs of a pickup in economic growth. Longer term yields were also influenced during the first

Footnote 3 continued
Continuing Weakness in M2," Board of Governors of the Federal Reserve System, Division of Monetary Affairs, Finance and Economic Discussion Series, no. 209, September 1992. The paper develops a new money demand model with an alternative opportunity cost measure to help explain the recent behavior of M2.

Chart 2
Selected Measures of Employment

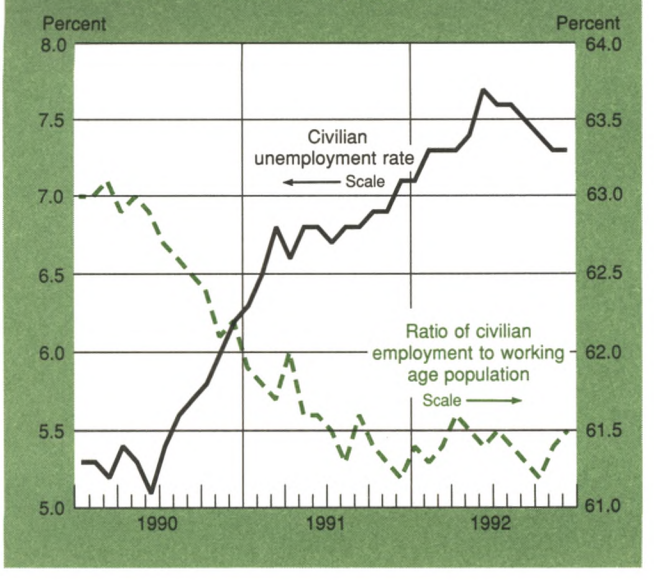
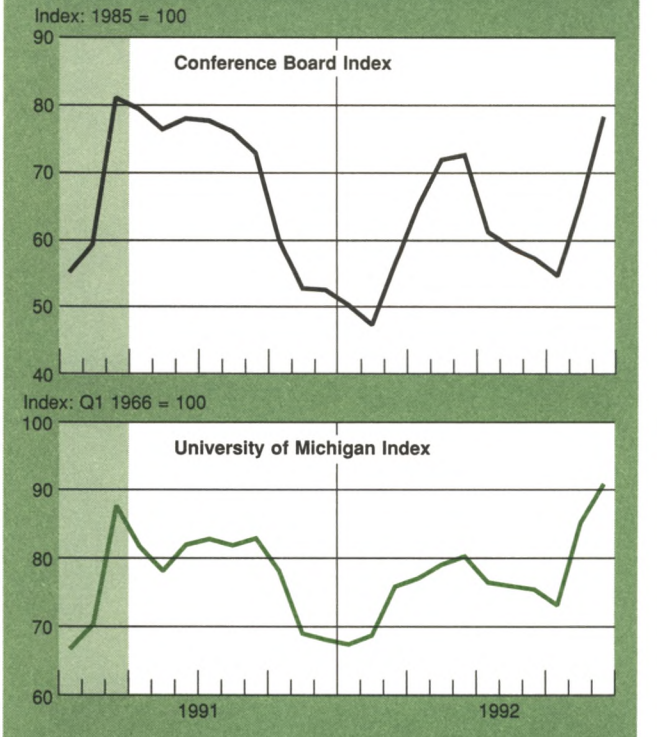


Chart 3
Measures of Consumer Confidence



Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

quarter by talk of a fiscal stimulus package, which raised concerns about further expansion of the budget deficit and contributed to renewed inflation worries. As the quarter progressed, increases in yields were tempered because it appeared increasingly unlikely that a fiscal stimulus package would be adopted.

Over the second and third quarters, short-term rates fell in concert with the three easing moves by the Federal Reserve. Treasury bill rates were generally fairly steady between the monetary policy changes, although additional rate declines followed the third easing move on September 4 when signs of economic weakness increased and further easing seemed likely. Meanwhile, coupon yields moved gradually lower over this period amid continued good news on inflation and indications that the economic recovery was sluggish. The Treasury yield curve steepened somewhat as investors began to focus on the political and economic uncertainty associated with the presidential election and worried once more about the potential for a costly fiscal stimulus package (Chart 6).

In the fourth quarter, short-term rates rose as the economy showed signs of strengthening, gradually leading the market to expect no further monetary policy easing. Long-term rates also rose in advance of the election as the likelihood of a Clinton victory grew along with concerns about the impact of his presidency on the budget deficit and inflation. After the election, coupon yields fell back somewhat when inflation remained subdued and stronger economic data appeared to reduce the likelihood of a large fiscal stimulus package from the new administration.

Treasury finance. During the year, the topic of the appropriate maturity mix of Treasury debt issuance received considerable attention. Discussion of possible changes in the mix influenced yields and revived old debates about debt management strategies and the term structure of interest rates. Suggestions were made early in the year that the Treasury might reduce the volume of long-term bonds and redirect more of its issuance to shorter term issues. Those supporting the shift argued that by taking advantage of the steep yield curve, the Treasury could reduce its borrowing costs. Others suggested that any initial savings could be wiped out by higher costs incurred when the debt was rolled over.

Analysts also debated whether a shift toward shorter maturity funding of the public debt would significantly flatten the yield curve and perhaps, by lowering long-term interest rates, also stimulate the economy. Proponents argued that lower long-term rates would induce private firms to issue more long-term debt and increase investment.[4]

[4]The effect of the issuance patterns on the yield curve depends critically on the degree of substitutability among Treasury securities of different maturities. High substitutability would make it difficult to influence the yield curve over any meaningful time horizon. But if substitutability is more limited, then Treasury issuance patterns could play a more important role.

Table 2

Price Information

Seasonally Adjusted Annual Rates of Change

	1991-IV	1992				1990-IV to 1991-IV	1991-IV to 1992-IV
		I	II	III	IV		
Consumer price index							
Total	3.3	3.3	3.1	2.7	3.2	3.0	3.1
Excluding food and energy	3.7	4.2	3.4	2.7	3.4	4.5	3.4
Energy	2.8	−2.5	4.5	5.9	1.7	−8.1	2.4
Producer price index							
Total	1.8	0.6	3.2	1.6	0.5	−0.1	1.5
Excluding food and energy	2.5	3.4	2.8	0.7	0.8	3.1	1.8
Energy	3.0	−8.0	11.3	4.5	−2.9	−10.2	1.0
Implicit GDP deflator	2.4	3.1	2.7	2.0	2.3	3.4	2.5
Fixed-weight GDP index	2.4	3.7	3.0	2.0	3.3	3.5	3.0
Employment cost index†	3.6	4.0	2.9	3.6	3.5	4.2	3.5

Note: GDP series are as of April 12, 1993.
†This index, which covers civilian workers, is computed for the final month of each quarter. The growth rates therefore represent growth from the final month of the previous quarter, rather than quarterly average rates.

Chart 4A

M2: Levels and Target Ranges

Cones and Parallel Bands

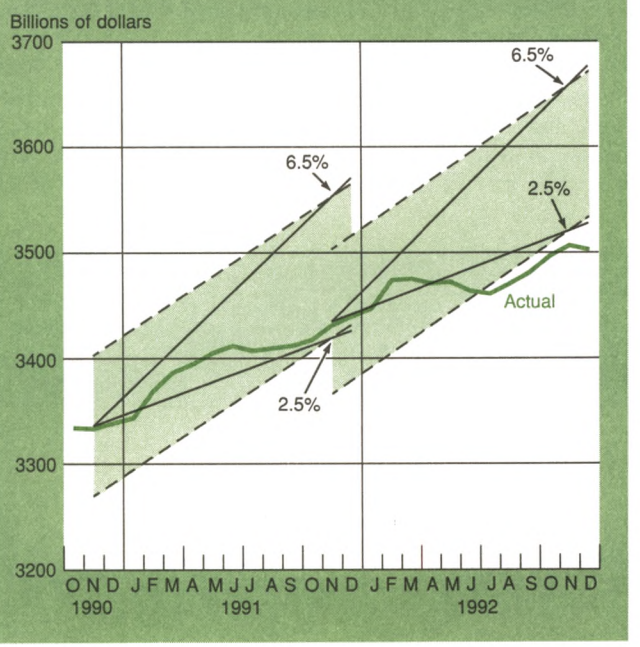


Chart 4B

M3: Levels and Target Ranges

Cones and Parallel Bands

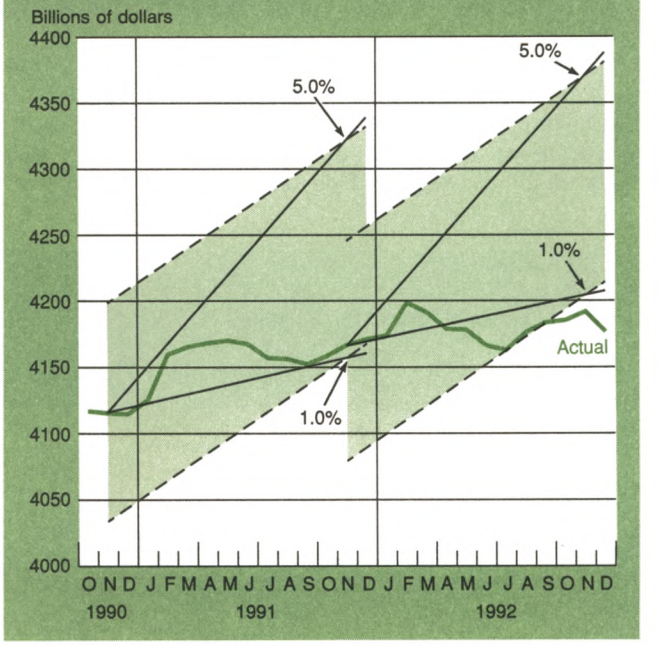


Chart 4C

M1: Levels and Growth Rates

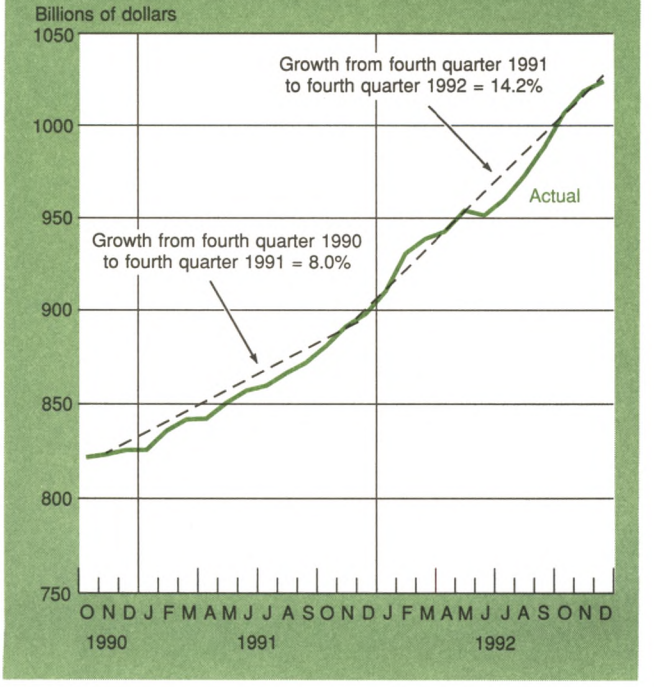
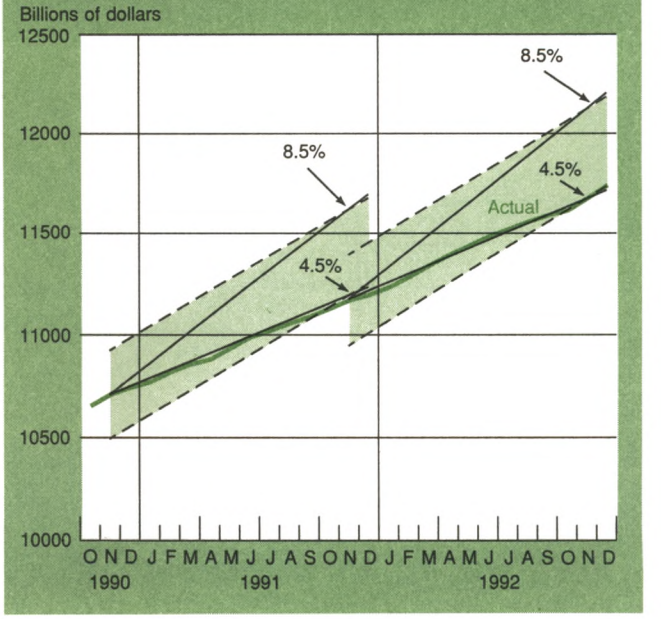


Chart 4D

Total Domestic Nonfinancial Debt: Levels and Monitoring Ranges

Cones and Parallel Bands



At the February midquarter refunding, the Treasury cut the sizes of the thirty- and ten-year issues by $2 billion and $1 billion, respectively. It also announced that it planned to maintain the revised proportions among the three-, ten-, and thirty-year issues at upcoming refundings.

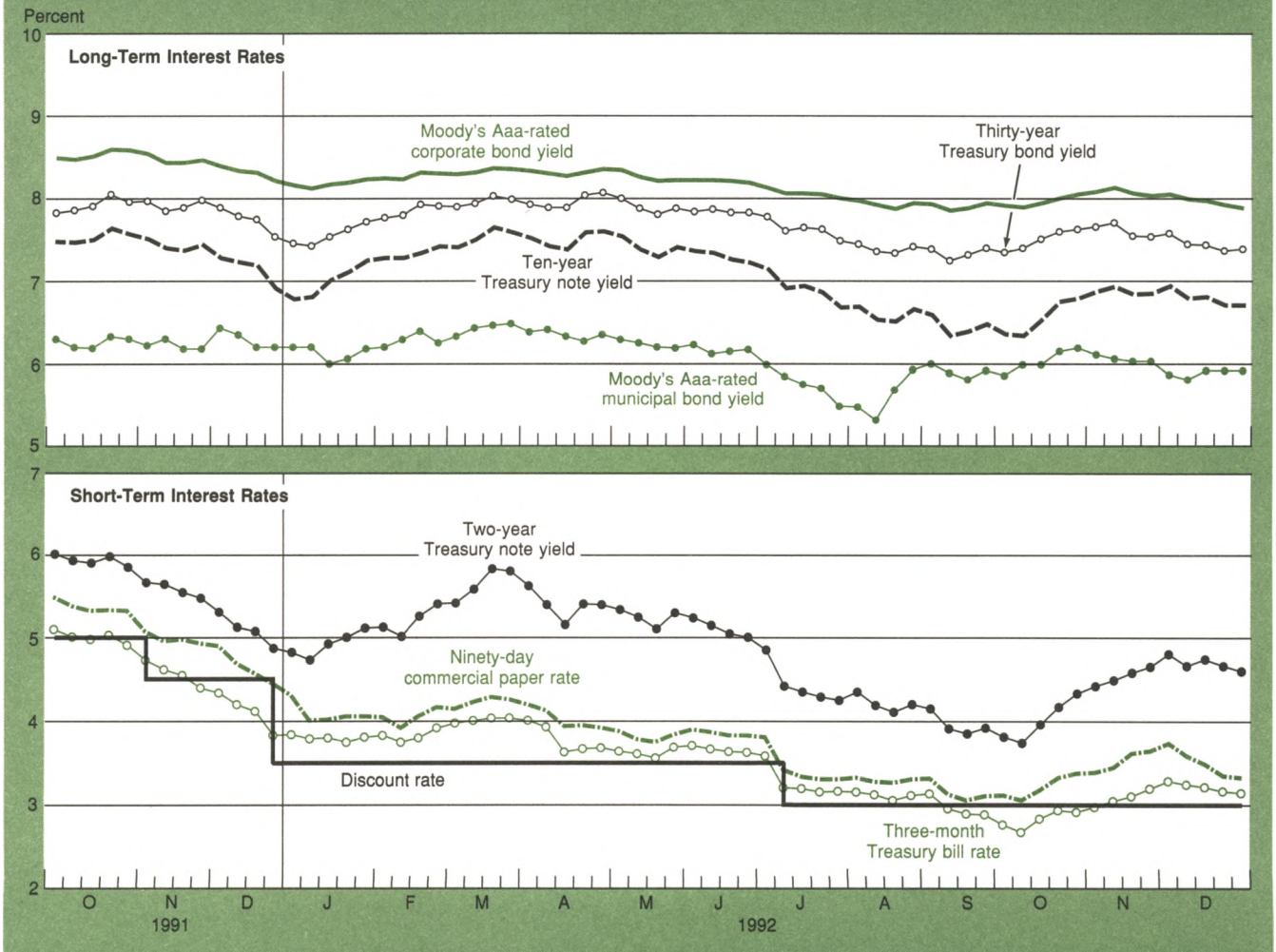
The topic of debt management was revived during the presidential election campaign when the candidates discussed the merits of selling less long-term debt. Expectations of smaller thirty-year bond issues may have slightly lowered yields on outstanding long-term bonds at times and also may have pushed up shorter term yields, although it was difficult to distinguish these effects from the consequences of changing economic and inflation prospects.

The Treasury began a year-long experiment with single-price auctions in the third quarter, using the new technique in monthly auctions of its two- and five-year notes. By applying the same price to all successful bids, the technique eliminates the so-called winner's curse, in which some of those with winning bids find that they have paid more than necessary. Proponents

Chart 5

Long-Term and Short-Term Interest Rates

Weekly Averages



Notes: Moody's Aaa-rated corporate bond yield and Aaa-rated municipal bond yield are based on issues with an average maturity of twenty years. Discount rate reflects Federal Reserve Bank of New York daily rate.

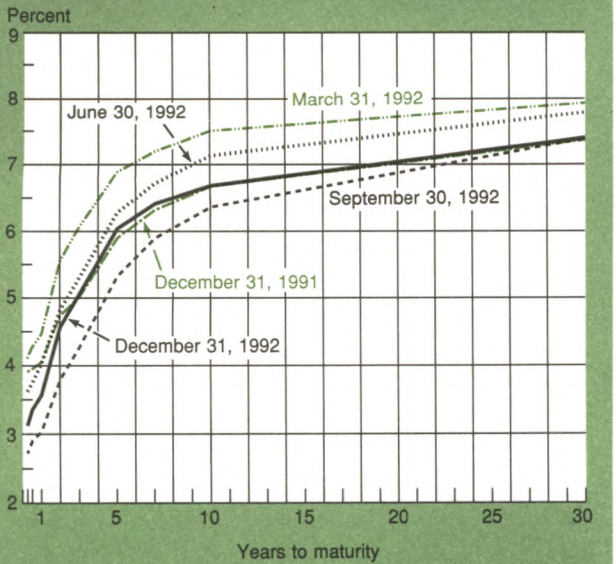
argue that the change has the potential to encourage a broader base of bidders at auctions, an outcome that could lower average yields and save money for the Treasury. As of the end of 1992, it was too early to judge the experiment either a success or a failure.

The *Joint Report on the Government Securities Market*,[5] published in January, had recommended occasional reopenings of Treasury debt issues in the event of shortages that could be disruptive to the smooth functioning of the secondary markets. The heavy financing activity of corporations, municipalities, and foreign governments in 1992 frequently caused temporary Treasury price movements as underwriters hedged their positions. Hedgers sold Treasury securities short and then borrowed the securities to meet delivery obligations. The impact was felt to a limited extent in the "cash" market, where securities are traded outright. It was more conspicuous in the repurchase markets, where dealers borrowed the securities they had sold short. In October, the hedging of corporate debt contributed to what was deemed an acute, protracted shortage of ten-year Treasury notes. The Treasury responded by reopening the latest ten-year note at the November refunding.[6]

[5]Prepared by the Department of the Treasury, the Securities and Exchange Commission, and the Board of Governors of the Federal Reserve System.

Chart 6

Yield Curves for Selected U.S. Treasury Securities



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

Financial strains. The financial stress that had restrained economic activity since 1990 abated during 1992 in major sectors of the economy, although vulnerabilities remained. Bank balance sheets, helped by increased profitability and new equity issuance, improved substantially. Falling interest rates enabled banks to profit from widening interest rate margins and rising security values. Delinquency rates declined because of the improving economic conditions and more conservative lending practices. Better loan quality also contributed to higher profits. In addition, banks actively raised new equity, reflecting the increasing importance attached to capital in the new regulatory environment of stiffer capital requirements.[7] All of these developments sharply increased the average ratio of equity to assets and improved the asset quality of banks during 1992.

The debt burden of households decreased during the year as many households refinanced existing debt at lower interest rates and reduced their use of credit. Lower interest rates spurred large-scale mortgage refinancing during 1992 (Chart 7). Consumer instalment credit, excluding mortgages, decreased sharply as a share of personal disposable income (Chart 8). Nonetheless, total household liabilities, a measure that includes mortgage debt, decreased only modestly as a fraction of personal disposable income and remained high by historical standards.

Some positive developments also were noted in the corporate sector, but the evidence was uneven. Profits increased as the restructuring moves of previous years began to be reflected in productivity gains, and economic activity picked up (Chart 9). Cash flow improved as a result of the higher profits and the lower interest payments associated with refinancing. Accordingly, the average ratio of net interest payments to cash flow for nonfinancial corporations, a measure of financial strain, decreased markedly. By contrast, the average ratio of

[6]The reopening was made possible by a recent Internal Revenue Service ruling exempting the Treasury from the usual restrictions on original issue discounts when it reopens an issue in order to eliminate an "acute, protracted" shortage. Normally, an issue sold with a discount greater than ¼ point for each full year remaining to maturity—the situation for the note in question—would be subject to different tax treatment than an issue that was sold closer to par. Without the tax ruling, it would have been necessary to treat the newly issued notes and the outstanding notes as separate issues.

[7]Banks were required to achieve capital ratios for risk-weighted assets of 4 percent for tier 1 capital and 8 percent for tier 1 plus tier 2 capital by the end of 1992. In addition, the Federal Deposit Insurance Corporation announced a new pricing scheme charging a lower deposit insurance premium to well-capitalized banks starting January 1993.

total assets to net worth, a measure of leverage, showed little sign of decline. Furthermore, prolonged financial strains forced some major corporations such as General Motors, Westinghouse, Sears, and IBM to announce restructuring moves that involved downsizing. The airline industry also continued to experience financial difficulties. Overall, financial conditions improved somewhat, and yields on corporate debt relative to those on Treasury issues declined modestly, reflecting increased investor confidence in the corporate sector.

Municipalities also took advantage of low interest rates to refinance their debt. Municipal debt issuance was particularly strong toward the end of the year as market participants perceived that the economy was improving and concluded that interest rates might be bottoming out.

Special factors also affected the municipal market over the course of the year. One influence was the expectation that property and casualty insurance companies would sell a portion of their inventory of municipal securities in absorbing the heavy level of claims associated with Hurricane Andrew's devastation of south Florida. Spreads of yields on municipal securities below comparable taxable yields narrowed consider-

Chart 7

Mortgage Application Indexes

Source: Mortgage Bankers Association of America.

Note: Purchase index is seasonally adjusted; refinance index is not seasonally adjusted.

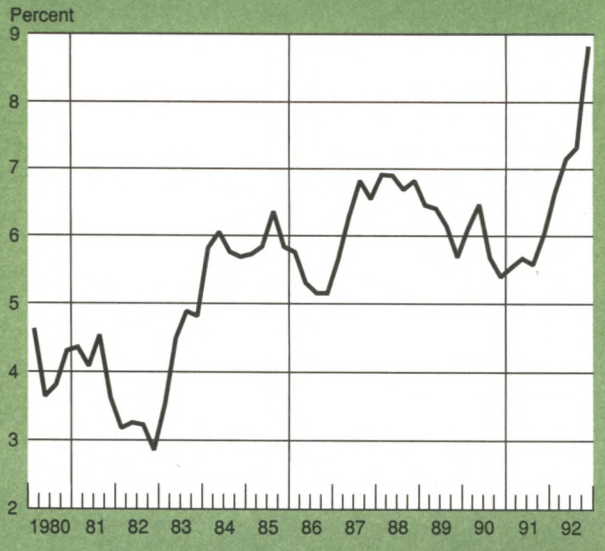
Chart 8

Consumer Instalment Credit as a Percentage of Personal Disposable Income

Sources: Bureau of Economic Analysis; Board of Governors of the Federal Reserve System.

Chart 9

Corporate Profitability



Sources: Bureau of Economic Analysis; Board of Governors of the Federal Reserve System.

Note: Chart shows corporate profits as a percentage of net worth.

ably in mid- and late August because of this expectation and the influence of heavy municipal issuance. Late in the year, some of the expected hurricane-related sales by insurance companies reportedly did take place, again putting upward pressure on municipal yields.

A factor working in the other direction, especially after the presidential election, was the expectation of an increase in marginal tax rates on high-income taxpayers sometime during 1993. This expected policy change increased the demand for municipal securities, pushing their yields downward relative to yields on taxable securities and more than offsetting the upward pressure from the sales by insurance companies.

International developments. Europe and Japan both experienced considerable financial stress during 1992, but this development had only limited impact on the demand for dollar-denominated debt. In June, Danish voters rejected the Maastricht treaty on European economic and monetary union. The referendum result, which dimmed the prospect of European financial integration, led to a decline in European stock market prices and an appreciation of the German mark, the strongest European Community currency, against other European currencies.

In July, domestic inflationary pressures induced the German central bank to raise its discount rate sharply. A large gap between U.S. and German short-term interest rates put upward pressure on U.S. interest rates and sent the dollar lower against the mark. Other European currencies then lost value against the mark as investors doubted the commitment and ability of the governments to maintain the value of their currencies against the mark. Subsequent devaluations of some European currencies led to heightened variability in exchange rates, but otherwise had little direct effect on U.S. financial markets.

In Japan, stock prices were often under downward pressure and were volatile at times. In August, the Nikkei average temporarily slipped below 15,000 for the first time in six years. Large capital losses in the Japanese stock market further curtailed the ability of some Japanese investors to invest abroad and hence limited their participation in U.S. financial markets. However, large and growing Japanese current account surpluses required offsetting capital outflows, which came mainly in the form of repayment of foreign currency deposits by Japanese banks.

Course of policy

Monetary policy in 1992 was conducted in an environment of uneven economic growth and continued moderation of inflationary pressures. The FOMC responded to indications of fragility in the economic expansion by easing reserve pressures on three occasions, leading to a cumulative reduction of 1 percentage point in the federal funds rate (Table 3). Meanwhile, the Board of Governors approved a ½ percentage point cut in the discount rate, bringing that rate to 3 percent. The policy moves in 1992 extended the string of easing steps begun in mid-1989. Since that time, the federal funds rate has fallen by nearly 7 percentage points while the discount rate has declined by 4 percentage points.

During the winter and early spring, most economic indicators suggested that an economic expansion of modest dimensions was under way. A pickup in retail spending and consumer sentiment and faster growth in the broader monetary aggregates early in the year were encouraging. Moreover, the FOMC during this time felt that enough stimulus probably had been provided through the series of easing steps implemented in the second half of 1991 to foster an upturn in economic activity consistent with a continued moderation of inflation pressures. Nonetheless, with the outlook still so uncertain, the Committee remained alert to signs that the economic expansion might falter. In mid-April, as the economy showed some signs of softening and after the broader monetary aggregates had contracted in March, the FOMC implemented a slight easing in reserve pressures that lowered the federal funds rate by ¼ percentage point. In addition, the Board of Governors announced early in the year that it would reduce the reserve ratio on net transaction accounts to strengthen the financial condition of depositories and to put them in a better position to extend credit.[8]

During the late spring and over the summer, evidence accumulated that the expansion might be losing momentum, and the FOMC eased reserve pressures further. By early summer it was becoming apparent that the strength in final demand seen earlier in the year would not be sustained. The unemployment rate rose, and consumer demand appeared to be restrained by continued weakness in the labor market. At the same time, the broader aggregates were about flat in May and June, and incoming data suggested that inflation was slowing further. Against this background, the Board of Governors approved a ½ percentage point cut in the discount rate in early July, and the FOMC allowed the full amount of this cut to show through to the funds rate. Economic data over the summer suggested that the expansion was continuing, but at a subdued rate. In early September, the FOMC implemented another slight easing of reserve pressures following a smaller than anticipated pickup in growth of the broader monetary aggregates, another reported decline in nonfarm

[8]The cut was announced in February and became effective in April. Details of the cut in reserve requirements appear in the following section.

payrolls, and the release of other data showing unexpected sluggishness in economic activity.

As autumn unfolded, the Committee was encouraged by the gradually improving tone of economic reports. Private payroll employment posted faster growth, and aggregate hours rose. A wide variety of indicators

Table 3

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

Date of Meeting	Specified Short-Term Growth Rates (Percent) M2	M3	Discount Rate (Percent)	Borrowing Assumption for Deriving Nonborrowed Reserve Path (Millions of Dollars)	Associated Federal Funds Rate† (Percent)	Effect on Degree of Reserve Pressure	Guidelines for Modifying Reserve Pressure between Meetings‡
12/17/91	November to March		4½	75	4½	Maintain	Slightly greater reserve restraint *might* be acceptable. Somewhat lesser reserve restraint *would* be acceptable.
	3	1½	3½ on 12/20	100 on 12/20§	4		
				75 on 1/16‖			
2/4 to 2/5/92	December to March		3½	75	4	Maintain	Slightly greater reserve restraint *might* be acceptable. Slightly lesser reserve restraint *would* be acceptable.
	3	1½		100 on 2/6‖			
3/31/92	March to June		3½	100	4	Maintain	Slightly greater reserve restraint *might* be acceptable. Slightly lesser reserve restraint *would* be acceptable.
	3½	1½		75 on 4/9††	3¾		
				100 on 4/30‖			
5/19/92	April to June		3½	100	3¾	Maintain	Slightly greater or slightly lesser reserve restraint *might* be acceptable.
	2½	1½		125 on 5/21‖			
				150 on 5/28‖			
				225 on 6/25‖			
6/30 to 7/1/92	June to September		3½	225	3¾	Maintain	Slightly greater reserve restraint *might* be acceptable. Slightly lesser reserve restraint *would* be acceptable.
	2	½	3 on 7/2	225 on 7/2‡‡	3¼		
				250 on 7/30‖			
8/18/92	June to December		3	250	3¼	Maintain	Slightly greater reserve restraint *might* be acceptable. Slightly lesser reserve restraint *would* be acceptable.
	2	½		225 on 9/3‖			
				200 on 9/4††	3		
10/6/92	September to December		3	200	3	Maintain	Slightly greater reserve restraint *might* be acceptable. Slightly lesser reserve restraint *would* be acceptable.
	2	1		175 on 10/8‖			
				150 on 10/15‖			
				125 on 10/22‖			
				100 on 10/29‖			
				75 on 11/5‖			
11/17/92	September to December		3	75	3	Maintain	Slightly greater reserve restraint *might* be acceptable. Slightly lesser reserve restraint *would* be acceptable.
	3½	1		50 on 12/10‖			
12/22/92	November to March		3	50	3	Maintain	Slightly greater reserve restraint or slightly lesser reserve restraint *would* be acceptable.
	1½	0					

†The federal funds rate trading area that is expected to be consistent with the borrowing assumption.
‡Modifications to reserve pressures are evaluated "in the context of the Committee's long-run objectives for price stability and sustainable economic growth" and "giving careful consideration to economic, financial, and monetary developments."
§This increase was made so that only part of the accommodation from the cut in the discount rate showed through to the market.
‖Change in borrowing assumption reflects technical adjustment to account for actual or prospective behavior of seasonal borrowing.
††Change in borrowing assumption reflects adjustment to reserve pressures.
‡‡The assumption was unchanged because the full effect of the discount rate cut was allowed to show through to the market.

pointed to improvements in retail sales, accompanied by a rebound in consumer confidence. Meanwhile, data suggested a continuing trend to lower inflation and some pickup in the growth of the monetary aggregates (although the broader aggregates weakened again in December). On balance, available evidence suggested that a moderate but sustainable expansion was under way. In this environment, the FOMC adopted a posture of watchful waiting and left monetary policy unchanged.

Policy Implementation

Operating procedures

Borrowed reserves. In 1992, the FOMC continued to formulate its policy objectives in terms of the "desired degree of reserve pressure," an approach it had first adopted almost ten years earlier. Formally, the concept of reserve pressure is specified in terms of an assumed amount of adjustment plus seasonal borrowing from the discount window. (These assumed levels of borrowing and other reserve measures for 1992 are presented in Table 4.) This borrowing allowance is associated with federal funds trading within an acceptable band around an expected level.[9] The Desk's reserve operations are designed to provide a level of nonborrowed reserves that just meets the estimated demand for total reserves less the allowance for borrowing and that is expected to be consistent with federal funds trading within the desired range.

The effectiveness of this approach to reserve management requires a reasonably predictable link between adjustment borrowing and the spread between the federal funds rate and the discount rate. This relation, however, eroded in the 1980s. When faced with apparent inconsistencies between the assumed behavior of borrowing and the federal funds rate, the Desk has in recent years generally modified its reserve objectives for the two-week maintenance period in a way designed to keep the funds rate within the desired range.

The decline in adjustment borrowing was encouraged by several developments. Beginning in the 1980s, the widespread publicity given to banks experiencing funding difficulties made many other banks reluctant to turn to the discount window out of concern that any borrowing could raise questions about their financial health.[10] Some reluctance to tap the discount facility persisted in 1992, even though many banks were able to strengthen their capital positions and improve their profitability.

A generally low level of adjustment borrowing was also encouraged by continued narrow spreads between the federal funds and discount rates. In 1992, the average effective federal funds rate exceeded the discount rate by just 27 basis points, little changed from the average spread of 24 basis points in 1991. In 1990 and 1989, this spread averaged 112 and 228 basis points, respectively. In fact, the expected levels of the funds rate and the discount rate were identical during the final four months of 1992. When the funds rate was equal to or below the discount rate in the past, borrowing was generally near frictional levels and the predicted relationships did not hold well.[11] A narrow rate spread, combined with the reluctance of many depositories to borrow, contributed to a similar situation in 1992. Adjustment borrowing was heavily concentrated on days when reserves were particularly scarce (most commonly on settlement days) or when unusual circumstances, such as interruptions to normal payments flows, forced some banks to turn to the window.

Reflecting these developments, adjustment credit averaged just $76 million a day in 1992, compared with $140 million in 1991 and $234 million in the preceding year.[12] Adjustment borrowing dropped to $13 million in the period ended November 11, when the average effective funds rate and the discount rate were virtually the same.[13] (Actual levels of borrowing and the effective federal funds and discount rates are presented in Chart 10.)

In addition, seasonal borrowing activity in 1992 was well below the levels of recent years. In part, seasonal credit was held down by the introduction of a market-related discount rate for this type of borrowing, effective in the maintenance period ended January 22. The rate charged on seasonal borrowing in a maintenance period is now determined by the average of the effective federal funds rate and the ninety-day composite certificate of deposit (CD) rate from the preceding period. Previously, the basic discount rate had been charged on seasonal credit. Moving to a market-based rate removed much of the price incentive for using seasonal credit that would otherwise have been present during the part of the year when the federal funds rate

[9]The association between borrowing and the funds rate is based on the historical relation between discount window borrowing—particularly adjustment credit—and the spread between the federal funds rate and the discount rate.

[10]The reluctance to borrow was discussed in "Monetary Policy and Open Market Operations during 1990," Federal Reserve Bank of New York *Quarterly Review,* Spring 1991, and "Monetary Policy and Open Market Operations during 1991," Federal Reserve Bank of New York *Quarterly Review*, Spring 1992.

[11]On a number of occasions in the 1970s and for a few months in 1980, the funds rate was about the same as or below the discount rate.

[12]Excluding special situation borrowing by banks with financial difficulties, the averages for 1991 and 1990 were $123 million and $164 million, respectively.

[13]This was the lowest average level of borrowing for a maintenance period since the July 9, 1980, week-long period. Adjustment borrowing averaged $14 million in the period ended November 13, 1991.

exceeded the discount rate.[14]

The average level of seasonal borrowing in every maintenance period in 1992 was below the level in the corresponding period in 1991. The impact of the new pricing procedure on seasonal credit became increasingly apparent in late spring, when the rise in seasonal borrowing typical at that time of year was slower than in previous years. For the year as a whole, seasonal credit averaged $97 million, compared with $155 million in 1991 and $223 million in 1990.[15]

Despite the lower average level of seasonal credit, the general behavior of this borrowing conformed to its usual pattern—rising through the summer and falling thereafter. To keep pace with these movements in seasonal borrowing, the Desk made six upward technical adjustments to the borrowing allowance between February and July, and afterwards made seven technical reductions to the allowance.[16]

Adjustments to recent cuts in reserve requirements. On February 18, the Board of Governors announced that it would reduce the reserve ratio on net transactions accounts from 12 percent to 10 percent, effective April 2. This reduction was the first major change in the reserve ratio on transactions accounts since the Monetary Control Act was adopted in 1980, and it followed the elimination of reserve requirements on nontransac-

[14]Declines in seasonal borrowing in other recent years resulted from a narrowing spread between the federal funds and discount rates and from reduced total credit needs.

[15]Seasonal borrowing peaked at $226 million in the period ended September 2; its lowest average level was $12 million in the period ended January 22.

[16]In addition, one downward technical adjustment was made to the allowance during the maintenance period in January when the switch to the new pricing procedure took effect.

Table 4

1992 Reserve Levels

Millions of Dollars

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	Initial Assumed Excess Reserves	Final Assumed Excess Reserves	Extended Credit Borrowing
1992													
Jan.	8	56,020	55,979	1,138	1,206	57,158	521	56,637	56,666	57,098	1,200	1,200	1
	22	54,966	54,925	913	935	55,879	136	55,743	55,725	55,850	1,000	1,000	0
Feb.	5	53,488	53,432	1,023	1,088	54,511	128	54,381	54,394	54,538	1,000	1,200	2
	19	54,435	54,489	1,168	1,177	55,602	68	55,533	55,600	55,226	1,000	1,000	2
Mar.	4	54,151	54,130	941	958	55,091	61	55,028	55,028	55,030	1,000	1,000	3
	18	56,001	56,149	508	395	56,509	74	56,434	56,470	57,002	1,000	1,000	2
Apr.	1	54,788	54,872	1,616	1,586	56,403	117	56,286	56,342	55,772	1,000	1,000	1
	15	49,174	49,247	1,065	1,085	50,238	55	50,183	50,277	50,140	1,400	1,000	1
	29	49,150	49,283	1,212	1,123	50,362	115	50,244	50,292	50,160	1,000	1,000	4
May	13	48,209	48,247	628	541	48,836	153	48,683	48,636	49,147	1,000	1,000	0
	27	47,277	47,314	1,497	1,488	48,774	158	48,617	48,645	48,271	1,000	1,000	0
June	10	48,492	48,492	474	482	48,965	152	48,814	48,823	49,354	1,000	1,000	0
	24	48,521	48,602	1,171	1,162	49,692	188	49,504	49,576	49,459	1,000	1,000	0
July	8	48,884	48,832	1,041	1,158	49,924	455	49,469	49,536	49,600	1,000	1,000	1
	22	49,106	49,041	950	1,061	50,056	215	49,841	49,887	49,816	1,000	1,000	0
Aug.	5	48,447	48,295	922	1,074	49,369	241	49,128	49,129	49,041	1,000	1,000	0
	19	49,856	49,833	825	837	50,681	249	50,432	50,421	50,585	1,000	1,000	0
Sept.	2	48,820	48,721	1,067	1,172	49,887	258	49,629	49,635	49,426	1,000	1,000	0
	16	51,081	51,153	795	681	51,876	321	51,556	51,514	51,927	1,000	1,000	0
	30	50,217	50,102	1,182	1,290	51,399	258	51,140	51,134	50,848	1,000	1,000	0
Oct.	14	52,099	52,127	1,149	1,115	53,248	185	53,064	53,057	52,781	1,000	1,000	0
	28	51,750	51,792	1,071	891	52,821	118	52,704	52,566	52,675	1,000	1,000	0
Nov.	11	53,346	53,365	728	754	54,074	66	54,008	54,052	54,204	1,000	1,000	0
	25	53,485	53,462	1,361	1,367	54,846	138	54,709	54,692	54,363	1,000	1,000	0
Dec.	9	54,625	54,563	841	937	55,466	95	55,371	55,406	55,469	1,000	1,000	0
	23	55,357	55,545	1,225	1,217	56,582	58	56,522	56,704	56,526	1,000	1,000	2
1993													
Jan.	6	56,288	56,253	1,385	1,437	57,674	269	57,405	57,422	57,254	1,000	1,000	0

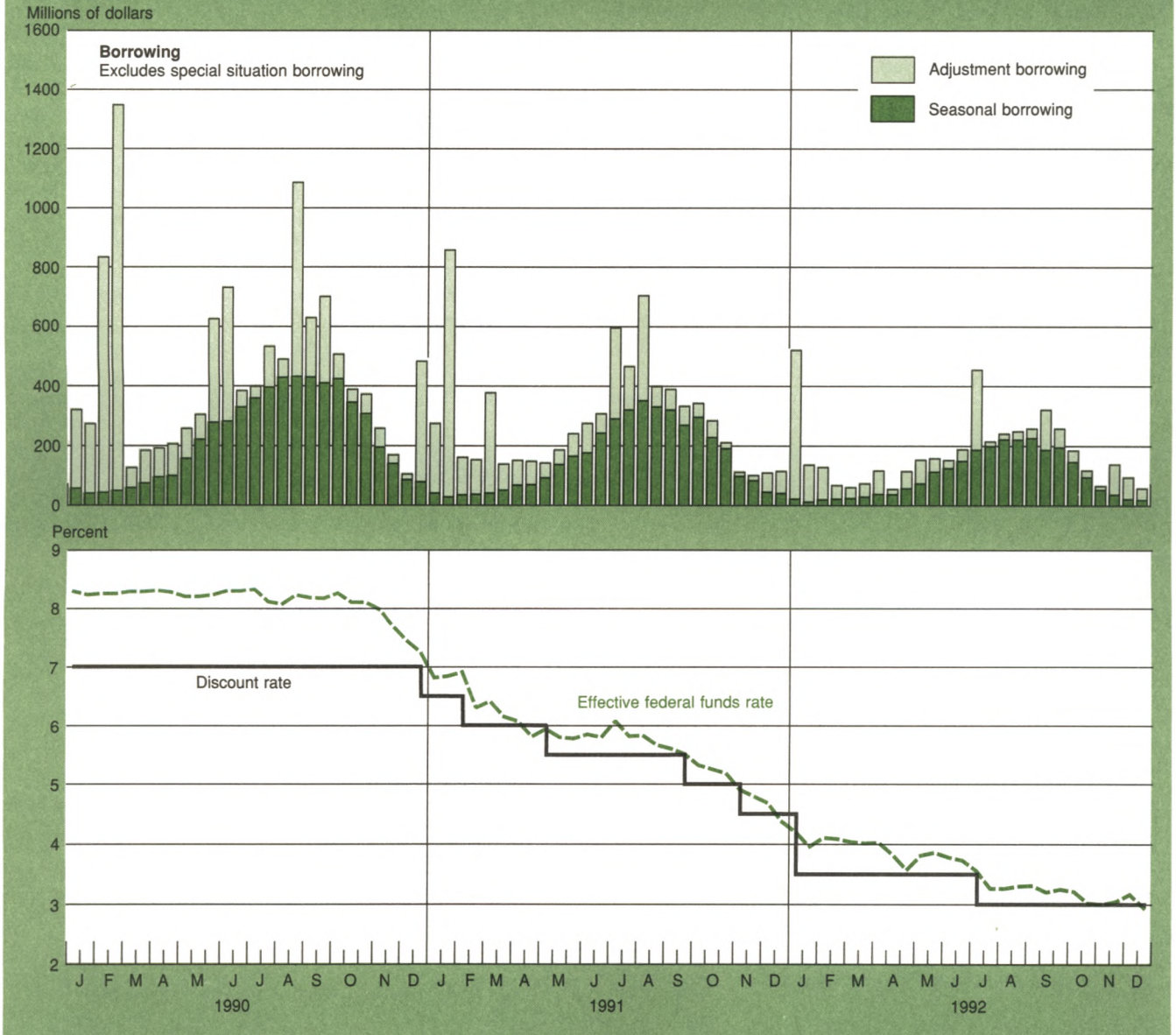
tions deposits in December 1990. This latest cut lowered required reserves an estimated $8 billion, almost all of which was met through a reduction in required reserve balances—the reserves that depository institutions hold at Federal Reserve Banks to meet their reserve requirements.[17]

[17]Required reserve balances are defined as required reserves less applied vault cash. A small portion of the April cut in reserve requirements was accomplished through reductions in applied vault cash.

Chart 10

Borrowing and the Behavior of the Federal Funds Rate and the Discount Rate

Maintenance Period Averages



Note: Discount rate reflects Federal Reserve Bank of New York daily rate.

Reserve balances at the Fed are used by depositories not only to meet reserve requirements, but also to process the heavy volume of daily transactions between financial institutions and to guard against unexpected late-day deposit withdrawals that could send a bank into overdraft.[18] Because a steep penalty is imposed whenever a depository institution ends the day overdrawn, considerable effort is made to avoid such overdrafts.[19] The demand for reserve balances for this purpose is especially high at the larger banks. Following the December 1990 cut to reserve requirements, depositories had struggled to adapt their reserve management practices to a sharply lower level of reserve balances, thereby complicating the Desk's efforts to formulate open market operations early in 1991.[20] Later in that year, the Desk was confronted with occasional difficulties as it sought to ensure that reserve supplies were both sufficient to meet requirements on a period average basis and adequate to support banks' daily clearing operations.

In April 1992, by contrast, serious difficulties in conducting operations were avoided, in large measure because the cut in requirements was implemented at a time when seasonal factors were working to elevate the level of required reserves. The high seasonal level of reserves helped to provide the liquidity needed to support clearing operations, despite the substantial cut in requirement ratios.[21] The timing of the cut was chosen because of the problems faced by the Desk the previous year when the reduction of reserve requirements preceded a pronounced seasonal decline in required reserve balances.[22]

[18]A discussion of the varied uses of reserve balances at the Fed appears in Ann-Marie Meulendyke, "Monetary Policy Implementation and Reserve Requirements," in *Reduced Reserve Requirements: Alternatives for the Conduct of Monetary Policy and Reserve Management*, Federal Reserve Bank of New York, April 1993.

[19]The charge for an overnight overdraft is the greater of 2 percentage points above that day's effective federal funds rate or 10 percent. Currently, daylight overdrafts that are covered before the close of business are not subject to a monetary penalty, although the Board announced that it plans to begin charging for such overdrafts in April 1994.

[20]During the initial adjustment period, the federal funds rate was unusually volatile, and excess reserve demand was highly uncertain. The adjustment to the December 1990 cut in requirement ratios was described in last year's report.

[21]The rapid buildup in transaction deposits, which raises the level of required reserves just ahead of the major April tax date, accounts for most of the seasonal increase in required reserve balances in April.

[22]Required reserve balances in early February 1991 averaged $16 billion in one maintenance period. They averaged about $22 billion in April 1992.

Several other factors also eased the Desk's reserve management problems immediately following the April 1992 cut in reserve requirements and mitigated reserve management difficulties later in the year. Rapid growth in M1 deposits in 1991 and 1992 lifted the underlying level of required reserves. In the fourteen months between the two rounds of reserve requirement cuts, the reservable portion of M1 rose at an annualized rate of 13 percent (calculated using seasonally adjusted data), and it continued to expand at a similar pace over the remainder of 1992. In addition, depositories significantly increased their required clearing balances.[23] These balances stood at $1.8 billion just before the December 1990 cut in reserve requirements, little changed from their level one year earlier. By April 1992, clearing balances had risen to $4.7 billion, and by the end of 1992 these balances had reached $5.9 billion. Most of this growth occurred at the larger institutions, which faced the most severe difficulties operating with low balances at the Fed.[24] Growth in required clearing balances has widened the gap between total reserves at the Fed and required reserve balances over the past two years (Chart 11).[25]

These developments partly offset the impact of the cuts in reserve requirements on the level of reserve balances at the Fed. Nonetheless, throughout 1992, reserve levels at the Fed remained below the levels reached ahead of the December 1990 cut in requirements, while the need for bank liquidity to support clearing operations remained high (Chart 12).[26] To date, reserve management difficulties of the magnitude witnessed in early 1991 when reserve balances fell to exceptionally low levels have been avoided; however,

[23]A depository can establish a clearing balance by specifying an average level of reserves that it will hold at the Fed for clearing purposes. In exchange, it receives credits that it can use to pay for priced services provided by the Fed at a rate determined by the effective funds rate. A discussion of the required clearing balance program appears in Spence Hilton, Ari Cohen, and Ellen Koonmen, "Expanding Clearing Balances," in *Reduced Reserve Requirements: Alternatives for the Conduct of Monetary Policy and Reserve Management*, Federal Reserve Bank of New York, April 1993.

[24]For many banks, an expansion in required clearing balances was made economical by further declines in the federal funds rate that raised the maximum useful clearing balance associated with a given use of priced services.

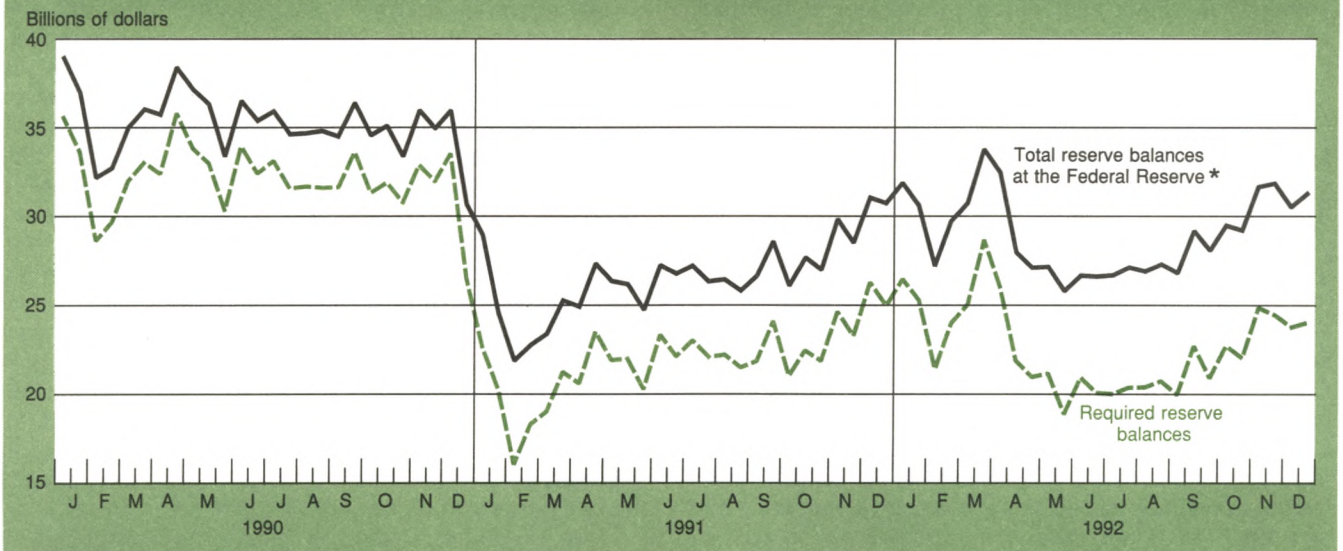
[25]The gap between total reserves at the Fed and required reserve balances is also affected by excess reserves and various "as-of" adjustments.

[26]In the two maintenance periods just before the December 1990 reserve requirement cut, reserves maintained at the Fed (including required clearing balances) averaged a bit more than $35 billion. In the corresponding periods in 1992, reserves at the Fed averaged just over $31 billion.

Chart 11

Reserve Balances

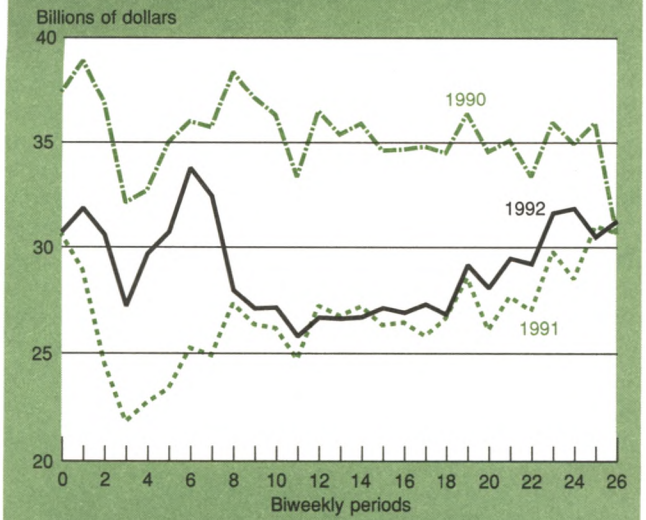
Maintenance Period Averages, Not Seasonally Adjusted



* Includes excess reserves and required clearing balances.

Chart 12

Total Reserve Balances at the Federal Reserve



Notes: Data are maintenance period averages and include excess reserves and required clearing balances. For each set of annual observations, period 1 covers the year-end, and period 0 is equal to period 26 from the preceding year.

some of the ways in which depositories have adapted their reserve management practices to cope with a lower level of required reserve balances have had an impact on the Desk's conduct of open market operations. In particular, since the December 1990 cut to reserve requirements, depository institutions have often deferred holding reserves to meet their requirements until late in a maintenance period.[27]

With a smaller available cushion of reserve balances, many depositories in 1992 chose to concentrate their reserve holdings toward the end of a maintenance period in order to avoid accumulating an excess position early on that could be difficult to run off later without risking an overnight overdraft. This reserve management approach was reflected in a dramatic shift in the distribution of excess reserves within a maintenance period. In the two years before the December 1990 cut in reserve requirements, the average levels of excess reserves in the first and second weeks of a maintenance period were similar in magnitude. In the

[27]Depositories as a group also slightly increased their average holdings of excess reserves, perhaps to help meet their liquidity needs. The implicit interest cost of holding reserve excesses, however, has discouraged depositories from significantly enlarging these balances.

following year or so, average holdings of excess reserves became skewed toward the second week of a period, and this imbalance became even more pronounced after the April 1992 cut in reserve requirements.[28] In many maintenance periods, a reduced demand for reserves early in the period contributed to a tendency for the federal funds rate to be on the low side of its expected trading range until late in the period, often despite a large need to add reserves during the period. In periods when the need to add was great, this intraperiod pattern of reserve demand interfered with the Desk's ability to provide reserves smoothly.[29]

The Board undertook some measures during 1992 to limit the difficulties faced by depository institutions and the Desk when working with low reserve balances at the Fed. Effective September 3, the limit on reserve excesses or deficiencies that could be carried forward for one maintenance period was doubled to the larger of 4 percent of a depository's required reserve level or $50,000. The enlarged carryover allowance would provide depositories with more flexibility to manage their reserve positions so as to meet reserve requirements and hold adequate balances for clearing purposes. Beginning with the period ended November 25, vault cash holdings were applied toward meeting reserve requirements with a one-period lag, a reduction from two periods. This shift was intended to raise the level of the seasonal trough that required reserve balances reach early each year.[30] Nonetheless, despite these measures and the other factors that have lifted reserve balances over the past two years, the level of balances maintained at the Fed remains low. Any developments that might further reduce reserve levels could weaken the Desk's ability to meet reserve needs smoothly.

Discrepancies between the federal funds rate and the reserve estimates. The Desk's temporary open market operations each period are designed to close the gap between the objective for nonborrowed reserves and the available estimates of nonborrowed reserve supplies.[31] Trading conditions in the money market typically reflect the general reserve picture, with reserve shortages (surpluses) associated with a tendency towards firmness (softness) in the funds rate. In 1992, conflicts between the federal funds rate in the morning and the reserve estimates for the period continued to arise frequently. The conflicts usually resulted from widespread market expectations of a possible change in Federal Reserve policy, incorrect estimates (available either to the Desk or to bank reserve managers) of the reserve need, or the reserve management strategy of depositories that wished to avoid accumulating excess reserves early in a period.[32]

The federal funds rate has taken on a high degree of visibility in recent years. Significant moves of the rate away from the level perceived to be the focus of policy can be misinterpreted as signaling a change in policy stance. In 1992, the close focus of market participants on the funds rate meant that the Desk often felt the need to take account of trading conditions in the money market in formulating its actions, even when doing so was likely to cause sharp movements in the funds rate later in the day or period. During much of the year, market participants believed that the FOMC was likely to adopt a more accommodative policy. Against this background, on a number of days when the funds rate was to the low side of its expected trading level despite a period need to add reserves, the Desk planned its course of action in a way that would clarify the stance of policy, or at least avoid sending misleading signals. Indeed, softness in the funds rate on many of these occasions resulted from widespread speculation about a near-term easing move. The Desk sometimes deferred meeting an add need, or substituted a smaller, less aggressive, customer-related operation in place of the System operation that the reserve profile suggested would be more appropriate. As a result, the funds rate sometimes firmed substantially in later trading, and on

[28] From January 1989 to December 1990, excess reserves in the first and second weeks of all maintenance periods averaged $950 million and $910 million, respectively. (The averages exclude the period covering the 1990 year-end, when excess reserves in the first week exceeded $10 billion.) From January 1991 through March 1992, the average levels in the first and second weeks of periods were $500 million and $1,790 million, respectively. From April through December 1992, the corresponding averages were $280 million and $1,740 million. Several factors could contribute to the depositories' tendency to hold more excess reserves in the second week of a period, including the expectation that interest rates might decline. Such an expectation would make depositories postpone holding reserves in the hope of acquiring them more cheaply later. However, the size of the imbalances and the fact that the expectations effect was also present in 1989 and 1990 strongly suggest that the effort to work with lower reserve balances played an important role.

[29] Of course, in the absence of sizable discount window borrowing, the Desk's operations will largely determine the level of excess reserves in a period ex post; however, in structuring its actions, the Desk often responds to indications of the immediate demand for reserves as reflected in current trading conditions in the money market. The following section addresses the discrepancies between the federal funds rate and reserve estimates in 1992 and the Desk's responses to these discrepancies.

[30] Both measures described in this paragraph were first proposed for public comment when the April 1992 cut in reserve requirements was announced.

[31] The nonborrowed reserve objective or "path" is derived by subtracting the borrowing allowance from estimates of the total demand for reserves (required plus excess).

[32] "Monetary Policy and Open Market Operations during 1991" examined in more detail why conflicts arise between the funds rate and the reserve estimates and how the Desk responds to these conflicts.

some settlement days borrowing was elevated.[33] On several occasions when an add need was seen, the Desk even drained a small amount of reserves to make clear the current stance of policy.[34]

Ideally, temporary conflicts between the funds rate and the reserve profile should not unduly complicate the Desk's approach to addressing reserve needs. Greater flexibility in formulating operations would allow the Desk to meet reserve needs in a period more gradually instead of having to address most of a need late in a period when arranging large-scale reserve operations can be difficult. Over time, greater tolerance for movements of the funds rate around an expected trading level might also decrease some of the attention market participants give to the rate as they try to interpret whether a movement signals a change in policy stance.

Over the final few months of 1992, market anticipation of an easing in policy diminished; however, incongruities between a soft funds rate and an estimated reserve shortage still occasionally arose. The Desk sought to use these opportunities to reestablish a degree of tolerance, eroded in the preceding few years, for discrepancies between estimates of the reserve need and trading conditions in the money market. The Desk took somewhat greater heed of the estimated reserve profile in formulating its operations, although it was careful to consider the possible information about the true reserve picture contained in market trading conditions. On several occasions, the Desk added reserves as called for by the reserve estimates even when the funds rate was a bit on the low side of the expected trading level, and at other times it took no action when the rate slipped to levels that previously might have moved it to drain reserves.

Open market operations and reserve management[35]

Changes in the System portfolio. The System's portfolio of U.S. government securities grew by $30.2 billion in 1992, an increase just slightly below the previous year's record expansion and well above most increases in the preceding decade. As in most years, outright purchases were concentrated in the market, although the Desk still bought a sizable amount of securities from foreign accounts. A moderate amount of securities was sold or redeemed in 1992.

The expansion of the portfolio was used almost entirely to offset the reserve drain arising from changes in operating factors. Increases in currency in circulation accounted for most of the net drain in reserves from market factors. The Federal Reserve also continued to reduce its holdings of foreign currency, a strategy that drained reserves. Required reserves were little changed on balance during the year. The impact of strong growth in the reservable components of the money supply on the level of required reserves was largely offset by the April cut in requirement ratios.

Maturity structure of the System portfolio. The composition of the Federal Reserve's portfolio of Treasury securities came under scrutiny in 1992, in part because of the attention focused on Treasury debt management strategies, described earlier. In these circumstances, the FOMC reviewed the history of the maturity structure and the principles that have guided the Desk's purchase and sale decisions.

The Federal Reserve manages its portfolio of Treasury securities in order to achieve its objectives for

Table 5
Weighted Average Maturity of Marketable Treasury Debt
Months

Year-End	Federal Reserve Holdings†	Total Outstanding
1960	19.3	55
1965	16.1	60
1970	23.9	40
1975	31.2	33
1976	34.2	36
1977	38.0	38
1978	47.4	44
1979	46.9	47
1980	53.7	48
1981	52.2	50
1982	48.6	47
1983	48.0	51
1984	50.4	55
1985	47.3	59
1986	43.7	62
1987	42.6	66
1988	40.5	67
1989	41.2	69
1990	38.7	68
1991	35.3	68
1992	36.2	67

†The effects of all outstanding temporary transactions—including repurchase agreements and matched sale-purchase transactions with foreign accounts—are excluded from the calculation of the average maturity of the portfolio.

[33]On several settlement days during the year, funds were firm even though reserves were estimated to be in surplus or at least adequate. There was little likelihood that a failure to add reserves in these circumstances would be misinterpreted as a signal that policy was being tightened. Still, the Desk usually provided extra reserves on these occasions to meet the apparent need reflected in the firm funds rate.

[34]These operations occurred during the maintenance periods ended February 5, February 19, March 18, April 15, April 29, June 24, and August 5.

[35]Details of portfolio changes in 1992, their causes, and the accuracy of the available forecasts of reserve supply and demand are presented in the appendix.

monetary policy. The securities purchased over time have largely supported the expansion of currency, although the size of the portfolio has also been adjusted in response to changes in the level of required reserves and to movements in other factors that have absorbed or supplied reserves. During the latter half of the 1970s and early 1980s, the average maturity of the System portfolio was fairly similar to the maturity of all Treasury debt outstanding (Table 5). This similarity occurred because the composition of the Desk's purchases was shaped to some extent by the relative supplies of Treasury securities in the market. This approach also represented a fairly neutral posture in relation to the yield curve.

In the mid-1980s, the Federal Reserve considered whether its liquidity needs might be better served by holding a proportionately greater amount of short-term securities. Although the Federal Reserve rarely had occasion to sell a large volume of securities from its portfolio, it needed to provide for possible contingencies. The Fed was reminded of the value of a liquid portfolio in 1984 when Continental Illinois National Bank faced a collapse of confidence. To keep operating, the bank borrowed a massive volume of reserves from the Federal Reserve's discount window. In response, the Fed reduced its holdings of Treasury bills to avoid an undesired increase in reserves in the banking system.

For several years thereafter, the Fed managed its portfolio in a way that gradually shortened the average maturity, while the Treasury was engaged in gradually lengthening the average maturity of its debt. The Desk concentrated its market purchases in bills, and it favored shorter term issues when rolling over maturing coupon securities. The Desk's effort to enlarge its bill holdings was interrupted in 1989 when the Federal Reserve's heavy purchases of foreign currencies provided more reserves than were consistent with policy objectives. The Desk offset that reserve creation by using a combination of redemptions and outright sales to reduce its bill holdings, a process made simpler by its highly liquid portfolio.[36] Over the next 1½ years, the Desk replenished its bill holdings by arranging all of its market purchases in bills (although it continued to acquire coupon securities from official foreign accounts).

In 1992, the Federal Reserve concluded that the desired buildup of liquid holdings had been achieved. Consequently, the Desk began to redirect slightly more of its purchases and rollovers to the longer maturities and to purchase a more even mix of bills and coupon issues in the market; however, the changes were intended to be modest. Consistent with this strategy, the Desk bought a record $19 billion of Treasury coupon securities in 1992, accounting for almost two-thirds of the total net increase in the System's portfolio.[37] Most of the growth in coupon securities was still in issues maturing within five years, but with longer dated issues making up a somewhat greater share of issues acquired in outright market purchases of coupon securities, holdings of longer term debt also increased. As a result of these efforts, the average maturity of the System's portfolio of Treasury securities ended its downward trend and rose by about one month.[38]

Forecasting reserves and operating factors. In formulating its reserve strategy, the Desk makes use of estimates of the demand for and supply of reserves. Forecasts of the demand for reserves are based on estimates of required reserves and expectations for excess reserve demands. Projections of the available supply of reserves are derived from forecasts of various operating factors. The accuracy of forecasts for most factors affecting reserve needs in each maintenance period usually improves as the period progresses, reflecting the availability of additional information. Still, large revisions coming late in the period do sometimes complicate the Desk's reserve management efforts.

In 1992, the accuracy of staff forecasts of operating factors generally improved moderately. Projections of the Treasury's Fed balance showed the most improvement. Staff members projecting reserves in 1992 did not have to contend with large foreign payments into the Treasury's Defense Cooperation Account for Desert Shield/Desert Storm contributions, which had proved difficult to anticipate in 1991. As usual, the largest projection errors of the Treasury balance in 1992 occurred around major tax dates.

Estimates of excess reserves were modestly better in 1992. However, if we exclude the early maintenance periods of 1991, when depositories were adjusting to sharply lower required reserve balances, the accuracy of excess reserves forecasts in 1992 was similar to that of forecasts in 1991. Meanwhile, forecast errors for required reserves were a bit larger at the beginning and in the middle of maintenance periods in 1992 than in 1991.

[36] In 1989, Treasury coupon holdings rose slightly, while the total value of the portfolio fell on net by $10 billion. Bill sales and redemptions that year totaled $25.5 billion (offset by $14.5 billion of purchases).

[37] Because of some outright sales and redemptions of bills, the figure for coupon purchases as a share of total purchases was somewhat lower. (There were no sales or redemptions of coupons.) Coupon purchases represented a considerably higher share of the total net increase in the System portfolio in 1987, when about $17 billion of coupon securities were purchased out of a total increase of $21 billion in the System's portfolio.

[38] A modest extension of the average maturity of new issues acquired by the Desk in exchanges at some Treasury coupon auctions also contributed to this lengthening of the average maturity of the System's Treasury holdings.

Appendix: Desk Activity for the System Open Market Account

This appendix reviews the Trading Desk's activities on behalf of the System open market account during 1992. It begins with a discussion of the outright changes made in the System portfolio during the year and the reasons for these transactions. Then it reviews the temporary transactions that were used to affect reserve levels. Finally it reports on the accuracy of staff estimates of the demand for and supply of reserves.

Outright changes in the System portfolio

Total System holdings of U.S. government securities rose by $30.2 billion in 1992 (Table A1), slightly below the record increase of $31.0 billion in 1991, but well above the average annual increase over the preceding decade (even excluding 1989, when the portfolio fell). About two-thirds of the net increase was in coupon securities, reflecting an effort to achieve a modest lengthening of the average maturity of the System's portfolio. At the end of 1992, the System's holdings had reached a total par value of $308.8 billion. Meanwhile, the Treasury's total marketable debt outstanding was rising at a similar pace, so that the System's share of that debt was about unchanged.

Bank reserve behavior

The expansion of the System's portfolio over the year was largely prompted by declines in reserves arising from movements in various operating factors. On balance, these factors drained almost $30 billion of reserves between the maintenance periods ended January 8, 1992, and January 6, 1993 (Table A2). Currency growth of $27 billion accounted for most of this reserve drain. The increase in currency was of record size, although its rate of growth was in line with growth rates during much of the past decade. Demand from abroad remained strong, although it was below the amounts estimated for the previous two years. In addition, strong domestic demand for currency emerged late in the year when the economy strengthened.

Changes in the System's holdings of foreign currency and certificates against special drawing rights (SDRs) also had a significant impact on the supply of reserves. Sales and a "dewarehousing" of foreign currency drained about $6½ billion of reserves over the year (market value), and net valuation losses on the System's portfolio of foreign assets drained roughly another $1 billion of reserves.† Interest earnings on foreign currency assets totaling $2 billion partly offset this drain. A demonetization of SDR certificates initiated by the Treasury in December to meet an International Monetary Fund quota increase drained $2 billion of reserves.

Most of the decline in the System's foreign currency holdings stemmed from a series of off-market transactions conducted directly between the Federal Reserve and the Bundesbank.‡ The Treasury's Exchange Stabilization Fund also dewarehoused the remaining $2 billion equivalent of its foreign currency holdings at the Fed in April. Net intervention in July and August in support of the dollar against the German mark decreased the Fed's foreign currency portfolio by a further $635 million equivalent (market value).

Responding to cuts in the reserve requirement ratios that occurred in the past two years, depository institutions increased their holdings of required clearing balances by almost $2 billion during the year in order to increase their reserve balances at the Fed. For convenience, these balances are treated as an operating factor and are included in the "other items" category in Table A2. In this framework, an increase in these balances lowers the supply of reserves coming from "other items." In fact, required clearing balances are a source of demand for reserves.

Other determinants of reserve supply and demand showed more modest changes on balance. Various operating factors provided net additions to reserves. Mean-

†Revaluations of the Fed's foreign currency holdings, which occur monthly, affect the "other items" category in the tables. When the Fed sells foreign currency, the book value of the currency sold is charged against "foreign currency" holdings, and the difference between the market and book values is charged against "other items." In 1992, the market value of foreign currency holdings sold was about $0.75 billion greater than the acquisition value.

‡The Federal Reserve sold a total of about $3.75 billion (market value) of German marks to the Bundesbank on May 20 in a spot and several forward transactions. The details of these transactions are provided in "Treasury and Federal Foreign Exchange Operations, May-July 1992," Federal Reserve Bank of New York *Quarterly Review*, Autumn 1992.

Table A1

Summary of Holdings in System Portfolio

Billions of Dollars

	Year-End 1992	Change during 1992	Change during 1991
Total holdings:	308.8	+30.2	+31.0
Bills	150.2	+11.5	+20.0
Coupons	153.2	+19.4	+11.3
Agency issues	5.4	−0.6	−0.3

Notes: Values are on a commitment basis. Changes in holdings are from year-end to year-end. Figures may not add because of rounding.

Appendix: Desk Activity for the System Open Market Account *(Continued)*

while, strong growth in the reservable deposit components of M1 during the year largely offset the effects of the April 1992 cut in reserve requirement ratios on the level of required reserves. Consequently, the level of required reserves was about unchanged at the end of 1992 from its year-earlier level. Levels of excess reserves around the last two year-ends were similar.

Adjustment borrowing at the end of 1992 was down from the elevated level over the previous year-end. Seasonal borrowing was relatively low, and borrowing under the extended credit program was virtually nil throughout the year.

Outright transactions

The Trading Desk conducted outright operations when reserve projections showed a large, sustained need to add or drain reserves. The overall volume of outright transactions in 1992 was well above the volume in the preceding year, even though the net expansion of the System's portfolio in each of the two years was similar (Table A3). The total size of outright transactions in 1991 had been depressed by the almost complete absence of

Table A2

Reserve Measures and Factors Affecting Reserves

Bank Reserves (Millions of Dollars)	Maintenance Period Ended January 6, 1993	Change during 1992†	1991‡
Nonborrowed reserves			
Excluding extended credit	57,405	768	1,858
Including extended credit	57,405	767	1,838
Extended credit borrowing	—	−1	−21
Borrowed reserves			
Including extended credit	269	−252	226
Adjustment plus seasonal	269	−252	247
Adjustment	257	−242	266
Seasonal	12	−10	−19
Required reserves§	56,288	268	4,540
Excess reserves	1,385	247	2,455
System Portfolio and Operating Factors (Billions of Dollars)‖			
System portfolio	308.8	30.2	31.0
Operating factors:			
Foreign currency††	18.7	−3.9	−4.9
U.S. currency	334.3	−27.1	−20.6
Treasury balance	7.3	2.2	−2.1
Float	2.5	1.7	−2.0
Special drawing rights	8.0	−2.0	—
Gold deposits	11.1	0.0	—
Foreign deposits	0.2	−0.3	0.2
Applied vault cash	31.1	1.5	0.7
Other items	17.6	−1.2	−2.3
Foreign repurchase agreement pool‡‡	7.3	−0.6	—

Note: Figures may not add because of rounding.
†Change from maintenance period ended January 8, 1992, to that ended January 6, 1993.
‡Change from maintenance period ended January 9, 1991, to that ended January 8, 1992.
§Not adjusted for changes in required reserve ratios.
‖Sign indicates impact of changes in operating factors on bank reserves.
††Acquisition value plus interest earnings. Revaluations of foreign currency holdings are included in "other items."
‡‡Includes customer-related repurchase agreements.

outright sales or redemptions of securities to meet the seasonal reserve overage that typically occurs in the first months of calendar years.[§] Early in 1992 the Desk did redeem a modest amount of Treasury bills at some of the weekly auctions and sold some bills to foreign accounts.

Most outright purchases of securities were arranged in the market, and more than half of these were for coupon issues, largely reflecting the desire to achieve a modest extension of the average maturity of the System's portfolio. In fact, coupon purchases accounted for three of the six occasions on which the Desk entered the market to buy securities outright in 1992.[‖] Over the preceding two years, the Desk had arranged to buy coupons in the market only once.

The Desk continued to arrange a sizable amount of its outright transactions with foreign accounts when orders were compatible with estimated reserve needs. However, the volume of these transactions in 1992 was substantially below the previous year's level, which had been lifted by heavy sales of Treasury securities by foreign institutions raising funds to pay for their Desert Shield and Desert Storm obligations. Almost all transactions arranged with foreign institutions in 1992 were for purchases by the Desk. Over one-half of these purchases were of coupon securities.

The Desk restricted its activities in federally sponsored agency securities to rolling over maturing issues if a suitable replacement was available, but it redeemed modest amounts when new issues were not offered or when offerings were smaller in size than the maturing issue. As a result, in 1992 the volume of outstanding federal agency securities in the System's portfolio continued its downward trend for the twelfth consecutive year.

Temporary transactions

The Desk arranges self-reversing transactions to meet temporary reserve needs. The frequency with which such transactions were arranged in 1992 was in line with earlier experience, but the distribution of their cumulative value was more heavily weighted than usual toward adding rather than draining reserves (Table A4). Furthermore, the Desk arranged multiday System RPs more often than in recent years, and these operations

Table A3

System Outright Operations by Type of Transaction and by Counterparty

Billions of Dollars

	1992	1991
Total outright	**37.9**	**31.8**
By type of transaction		
Purchases	34.1	31.4
Bills	14.7	20.2
Coupons	19.4	11.3
Sales	1.6	0.1
Bills	1.6	0.1
Coupons	0.0	0.0
Redemptions	2.2	0.3
Bills	1.6	0.0
Coupons	0.0	0.0
Agency issues	0.6	0.3
By counterparty		
Total outright in market	21.9	10.4
Purchases	21.9	10.4
Bills	9.7	8.1
Coupons	12.3	2.3
Sales	0.0	0.0
Bills	0.0	0.0
Coupons	0.0	0.0
Agency issues	0.0	0.0[†]
Total outright with foreign accounts	13.8	21.2
Purchases	12.2	21.1
Bills	5.1	12.1
Coupons	7.1	9.0
Sales	1.6	0.1
Bills	1.6	0.1
Coupons	0.0	0.0

Note: Values are on a commitment basis. Figures may not add because of rounding.

[†]One sale totaling $5 million occurred during the year, but the rounded value is zero.

[§]A substantial share of the seasonal reserve surplus forecast for early 1991 had been addressed in late 1990 when the cut in reserve requirements prompted the Desk to drain large amounts of reserves; moreover, an unusually high Treasury balance through February 1991 reduced the size of the reserve surplus at that time.

[‖]The Desk bought $3.2 billion of bills on May 27, $3.5 billion of coupons on June 2, $3.7 billion of coupons on September 1, $3.9 billion of bills on October 27, $5.0 billion of coupons on November 18, and $2.5 billion of bills on December 15. Although the Desk usually buys securities outright in the market in April to meet a seasonal reserve need, the cut in reserve requirement ratios had sharply reduced the size of this need in 1992. Consequently, no outright market purchase took place in the month.

Appendix: Desk Activity for the System Open Market Account *(Continued)*

accounted for an unusually large share of the total value of all temporary reserve injections. Often a large portion of the value of these multiday RPs was withdrawn by dealers ahead of the original maturity date, and the Desk frequently had to follow up with another temporary reserve addition as a result. On several occasions when the Desk saw a particularly deep reserve need, a multiday RP was made nonwithdrawable.††

The number of matched sale-purchase transactions (MSPs) arranged in the market in 1992 was on the low side of the range established in recent years, and the cumulative value of these transactions was well below recent levels. The relatively small number and size of MSPs arranged in 1992 arose in part because few maintenance periods in the year were marked by large reserve surpluses. Only a small number of the MSP transactions had maturities exceeding one business day.

The Desk typically announced to the market at around 11:30 a.m. any intention either to add or drain reserves that day. On one occasion, when high projected levels of the Treasury's Fed balance led to a deep estimated daily reserve deficiency, the Desk acted to ensure adequate propositions by announcing a day in advance its intention to arrange multiday System RPs. On two days ahead of holidays late in the year when the market was scheduled to close early and the Desk faced sizable estimated reserve needs, it entered the market ahead of its usual intervention time to ensure adequate propositions.

††Nine of the fifty-two multiday System RPs arranged in 1992 were nonwithdrawable. The corresponding number in 1991 was three.

Forecasting reserves and operating factors

In formulating a strategy for meeting reserve needs, the Desk took into account potential revisions to the estimated demand for and supply of reserves. Faulty projections can hamper the formulation of an effective strategy, especially when they occur late in a maintenance period, because they can necessitate large reserve operations. During 1992, the accuracy of staff forecasts of excess reserves and of operating factors improved relative to 1991, while required reserve forecasts were less accurate

Table A4

System Temporary Transactions

Billions of Dollars

	1992		1991	
	Number†	Volume	Number†	Volume
Repurchase agreements				
System	80	392.9	63	332.9
Maturing next business day	28	120.0	32	167.4
Term	52	273.0	31	165.5
Customer-related	64	140.4	79	175.8
Matched sale-purchase transactions				
In market	20	28.6	33	75.3
Maturing next business day	17	23.0	29	66.8
Term	3	5.7	4	8.4
With foreign accounts‡	253	1453.8	251	1495.2
Total temporary transactions	417	2015.8	426	2079.1
In market	164	562.0	175	583.9

Note: Figures may not add to totals because of rounding.

†Number of rounds. If the Desk arranged repurchase agreements with two different maturities on the same day, the agreements are treated as one round. The Desk arranged such multiple agreements on one day in 1992 and at no time in 1991.

‡Volumes exclude amounts arranged as customer-related repurchase agreements.

Appendix: Desk Activity for the System Open Market Account *(Continued)*

(Table A5).[‡‡]

On the demand side, the forecast errors for required reserves were a bit larger early and in the middle of maintenance periods than in 1991. By the final day of the period, the size of these projection misses usually had narrowed considerably and, on average, was about unchanged from the previous year. Nonetheless, sizable revisions resulting from unexpected deposit flows around large tax payment dates or holidays occurred very late in several maintenance periods.

The excess reserves forecasting performance improved in 1992, largely because excess demand had been particularly difficult to predict in early 1991 when operating balances had been unusually low.[§§] The actual behavior of excess reserves remained uncertain and volatile in 1992, and numerous informal adjustments were made to the formal allowance during the year.[‖‖] An elevated level of carry-ins contributed to this volatility.[†††] The formal allowance for excess reserves was held at $1 billion during most of 1992. It was raised during the February 5 period to reflect expected pressures from low operating balances, and again at the start of the April 15 period when the cut in reserve requirements took effect, although the expected high demand for excess in this later period did not materialize.

On balance, the forecasts of operating factors were more accurate at the beginning and middle of maintenance periods than in 1991, despite a jump in the variability of operating factors from period to period. The accuracy of the forecasts by the final day of the period

[‡‡]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 takes into account a forecast of the Treasury's Federal Reserve balance, an operating factor, made by the Treasury staff.

[§§]Forecast errors for excess reserves are calculated using projections of the demand for excess reserves made by the New York and Board staffs. These projections are not usually incorporated in the formal allowance for excess reserves built into the Desk's reserve objective. The measurement of the forecast errors of the demand for excess reserves is imprecise because the projections are compared with actual holdings of excess reserves in a period. Excess reserves ex post can be affected by unexpected movements in reserve supplies occurring on the final day, or by the Desk's

Footnote [§§] continued
decisions to over- or under-provide reserves in response to other considerations. Finally, the calculation of forecast errors of the demand for excess reserves does not take account of the informal adjustments to the forecasts the Desk frequently makes on the basis of carry-ins or the observed pattern of excess reserve holdings to date in a period.

[‖‖]The average period-to-period change in excess reserves in 1992 was $362 million. This amount was well below the level for all of 1991, but a bit above last year's average level if one excludes the first few periods in 1991, when banks were dealing with exceptionally low operating balances.

[†††]The average absolute level of carry-ins at large banks in 1992 was $96 million, compared with $72 million the previous year and $56 million in 1990.

Table A5

Approximate Mean Absolute Forecast Errors for Various Forecasts of Reserves and Operating Factors

Millions of Dollars

	1992			1991		
	First Day	Midperiod	Final Day	First Day	Midperiod	Final Day
Reserves						
Required	350-365	245-270	80	290-320	165-200	70-80
Excess[†]	220-245	210	—	300-335	215-250	—
Factors	1005-1095	385-465	60-85	1200-1285	590-815	50-60
Treasury	700-830	240-330	45-50	865-885	480-660	40-45
Currency	355-430	140-215	20-40	325-410	160-170	15-20
Float	180-190	135	35-45	230-280	125-150	40-50
Pool	245	140	10	330	115	10

Note: Ranges indicate varying degrees of accuracy by the New York Reserve Bank and Board of Governors Staffs.
[†]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.

Appendix: Desk Activity for the System Open Market Account *(Continued)*

was about the same as in the previous year.

Most of the improvement in the forecast accuracy for total market factors resulted from more accurate projections of the Treasury's balance at the Federal Reserve. The improvement was achieved even though the mean absolute period-to-period change in the Treasury's Fed account was about the same in 1992 as in the previous year. Some of the improvement in these forecasts stemmed from the absence in 1992 of large foreign official payments into the Treasury's Defense Cooperation Account for Desert Shield and Desert Storm expenses; uncertainty over the timing of these payments contributed to large errors in 1991. In addition, Resolution Trust Corporation outlays, which have proved to be very unpredictable, declined in 1992.

As usual, the majority of the largest projection misses occurred following major filing deadlines for individual nonwithheld and corporate taxes. The timing and size of the Treasury's revenue flows were often uncertain during these periods; moreover, the Treasury's total cash holdings often exceeded the capacity of the Treasury's tax and loan accounts in the banking system, thus causing large remittances that swelled the Fed balance.‡‡‡ By far, the largest start-of-the-period projection miss in 1992 occurred in September, when unexpectedly high tax receipts led to a $6 billion period-average error.

To deal with the greater volatility in cash balances after tax dates and to guard against inadvertent overdrafts, the Fed and Treasury changed their standard procedure for administering the Treasury's Fed account in the two weeks following major tax deadlines. The change was precipitated by an exceptionally large daily forecast miss one day in the period ended April 29 that left the Treasury balance at a very low level ($1.9 billion). For the remainder of that period, the Treasury and the Desk raised the "targeted" level of the Treasury balance at the Fed from its usual $5 billion level to $6 billion. Subsequently, the Fed and the Treasury agreed to lift the targeted level of the Treasury balance to $7 billion for the two weeks or so following all major tax dates.

Initial errors in forecasting the size of the pool of temporary foreign investments decreased in 1992 from 1991. During 1991, foreign official institutions had often invested funds in the temporary pool with little advance notice, and had later paid the funds to the Treasury's Defense Cooperation Account. These unexpected investments had caused some large projection misses. In the absence of these payments in 1992, the forecast accuracy returned to more normal levels.

An additional factor that contributed to forecast errors in 1992 was the premium or discount paid on reserve transactions undertaken by the Desk. A premium or discount arises when the par value of the securities exchanged in either a temporary or an outright transaction differs from the market value. The actual reserve impact is determined by the market value of the securities—price plus accrued interest—less a margin to protect against price declines in the case of RPs. The formal measure of the reserve impact of an operation is based on the par value of the securities traded. The difference between the par value and the cash amount shows up as a forecast miss in the "other items" component of nonborrowed reserves on the day following a reserve operation. At the start of each maintenance period, the projections of this market factor make no allowance for any possible discount or premium, even in periods when large reserve operations are anticipated. Falling interest rates during the past two years lifted the prices of many outstanding issues with large coupons above par, enlarging the average premium in 1992. Consequently, the actual reserve impact of reserve addition operations often exceeded by a substantial margin the initial calculation based on the par value of securities acquired. In 1992, net premiums on securities held under RP averaged about 5 percent of the value of these operations. When deciding the par value of securities to accept under RP, the Desk often made an informal allowance for the likely size of the premium.

‡‡‡The Treasury's Fed balance was above its "target" level because of capacity limitations on about twenty business days in 1992, down considerably from about fifty days in 1991. In 1990, the number was fifteen.

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