The Impact of Changes in FOMC Disclosure Practices on the Transparency of Monetary Policy: Are Markets and the FOMC Better "Synched"?

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Since 1989, the Federal Open Market Committee (FOMC) has adopted many practices that improve the transparency of its policy actions. The following list includes some of those practices and their initiation dates:

- August 1989: Policy changes in the funds rate target are limited to multiples of 25 basis points.
- February 1994: A press statement describing policy actions is released at the conclusion of any FOMC meeting at which an action was undertaken.
- August 1997: Public acknowledgment is made that policy is formulated in terms of a target for the federal funds rate (the intended funds rate).
- August 1997: A quantitative intended funds rate is included in the Directive to the Federal Reserve Bank of New York.
- May 1999: A press statement is issued immediately following the conclusion of every FOMC meeting at which there are major shifts in the Committee's views about prospective developments. Such statements provide an indication of the policy "bias."
- January 2000: A "balance of risks" statement in the announcement replaces the previous policy "bias." After every meeting, the FOMC issues a statement that reports the settings of the target funds rate and the balance of risks.
- March 2002: The vote on the Directive and the names of dissenting members, if any, are included in the press statement.

The purpose of these changes, which have gone a long way toward lifting the traditional veil of secrecy over monetary policy, is to increase transparency of policy, improve accountability, and provide better information to market participants about the future direction of policy. This analysis examines how expectations of market participants about future policy actions have changed over the decade during which these changes were implemented.

Our measure of how market participants respond to "news" is the daily change in the yield on a one-month-ahead futures contract for federal funds. The yield on this contract can be interpreted as a measure of a consensus forecast in the market of the average effective federal funds rate over the next calendar month. For example, the change in the yield on the one-month-ahead federal funds futures contract from the close of business yesterday until the close of business today is a measure of the impact of today's news in the market. This measure of news is not unique, but we have found it highly correlated with measures that other researchers have proposed, as well as with the commentary on economic information that appears in the press.[1]

Small changes in our measure of news reflect merely ambient noise in financial markets, absent the revelation of any significant information. From our examination of the data, we have concluded that a change in our measure smaller than 5 basis points in absolute value is insignificant "noise."[2]

The behavior of our news measure on days that the FOMC changed the intended federal funds rate is shown in Figure 1. This figure is rather complex because we have attempted to present a large amount of data.

- The time line starts with October 1988, when trading began in the federal funds futures market, and continues through the December 2001 FOMC meeting when the intended federal funds rate was lowered to 1.75 percent.
- The data shown are the daily changes (close of business to close of business) in the yield

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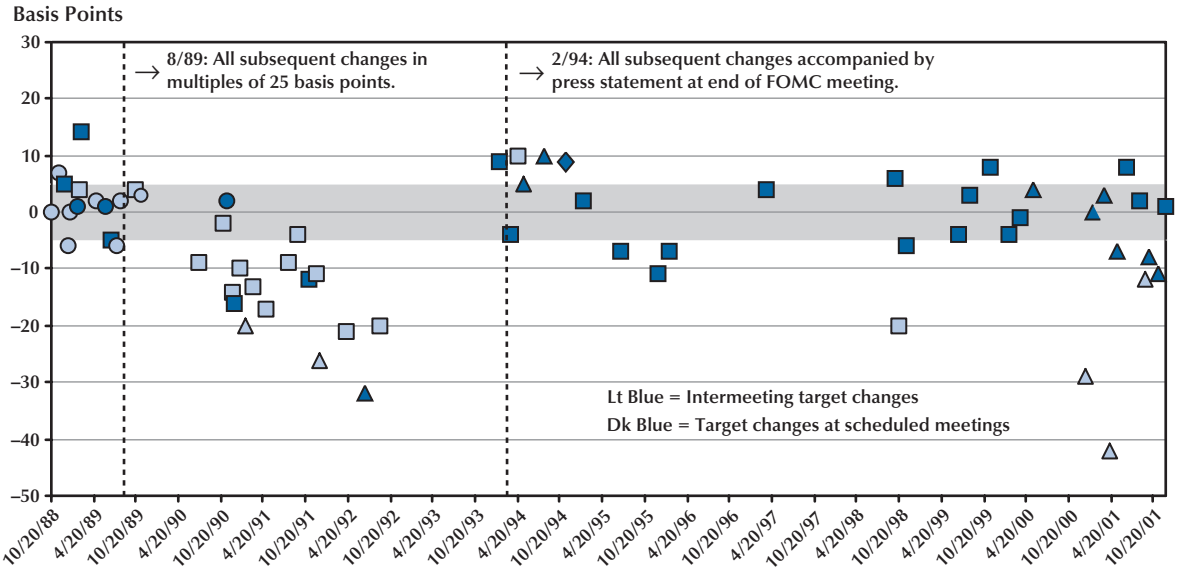
[1] For additional discussion and analysis of expectations about future federal funds rates, see Poole and Rasche (2000) and Kuttner (2001).

[2] For a detailed analysis see Poole, Rasche, and Thornton (2002).

Figure 1

Surprises to Fed Funds Futures Rate When Policy Actions Were Implemented



NOTE: □ 25-basis-point change, △ 50-basis-point change, ◇ 75-basis-point change, ○ change that market was not immediately aware had occurred (Poole, Rasche, and Thornton, 2002).

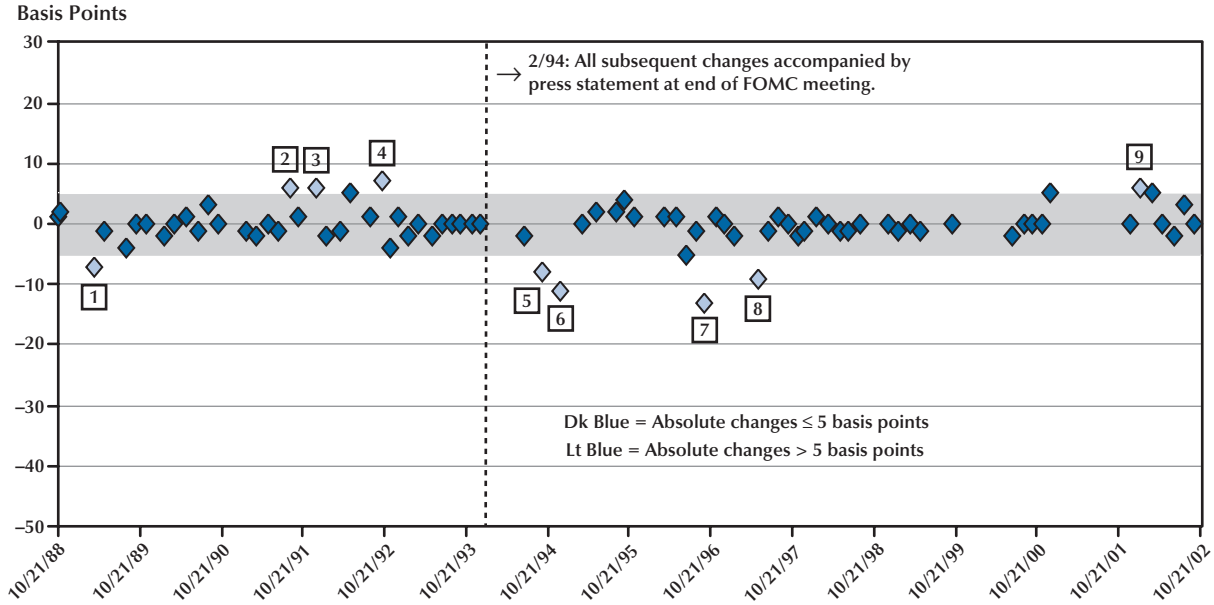
on the one-month-ahead federal funds futures contract.

- The points plotted in light blue indicate policy actions that were undertaken between regularly scheduled FOMC meetings. Points plotted in dark blue indicate policy actions undertaken at regularly scheduled FOMC meetings.
- Points plotted with a square indicate 25-basis-point changes in the intended funds rate; points plotted with a triangle indicate 50-basis-point changes in the intended funds rate; and the point plotted with a diamond (November 15, 1994) indicates a 75-basis-point change in the intended funds rate.
- The area shaded in gray, plus and minus 5 basis points, indicates the region that we have defined as insignificant noise in this market.
- The graph is divided into three sections, each of which reflects a different context in which FOMC policy actions were implemented.
  (i) Before August 1989, policy actions were not announced and were frequently smaller than 25 basis points. Our reading of the news reports indicates that in most cases market participants were not aware of these policy actions on the day following the decision. These points are plotted as circles.
  (ii) From August 1989 until February 1994, all policy actions were 25 basis points or multiples thereof but were not publicly announced. However, with four exceptions, we were able to confirm from newspaper reports that market participants detected the policy action on the day following the decision.
  (iii) From February 1994 to the present, all policy actions were 25 basis points or multiples thereof and each action was publicly announced by the FOMC following the decision.

Our conclusion from this analysis is that intermeeting moves (the light blue points) generate news to the market. That is, such moves generally surprise markets. In many cases these surprises are large. The FOMC and market participants are not well "synched" in these circumstances. In contrast, policy actions taken at regularly scheduled FOMC meetings, particularly since February 1994, generate little if any news in the market. Such actions have been well anticipated by market participants. The data suggest that these actions at most involved small surprises. In these circumstances the FOMC and market participants seem to be well synched. Our interpretation is that financial market participants

Figure 2

Surprises on FOMC Meeting Dates with No Policy Actions



NOTE: Surprises before 2/94: (1) = 3/29/89 (–.07), (2) = 8/21/91 (.06), (3) = 12/19/91 (.06), (4) = 10/7/92 (.07); surprises since 2/94: (5) = 9/27/94 (–.08), (6) = 12/20/94 (–.11), (7) = 9/24/96 (–.13), (8) = 5/20/97 (–.09), (9) = 1/30/02 (.06).

have observed incoming information on the economy and have correctly perceived how the FOMC will respond to that information.

The second graph, Figure 2, refers to cases where "the dog didn't bark"—FOMC meetings at which no policy action was implemented.

- The time line starts with October 1988, when trading began in the federal funds futures market, and continues through the September 2002 FOMC meeting.
- The area shaded in gray, plus and minus 5 basis points, indicates the region that we have defined as insignificant noise in this market.
- There are only nine points over the entire period that we believe indicate surprises to market participants. Four of these occurred before February 1994 and five occurred subsequent to that date. All of the "surprises" are relatively small.

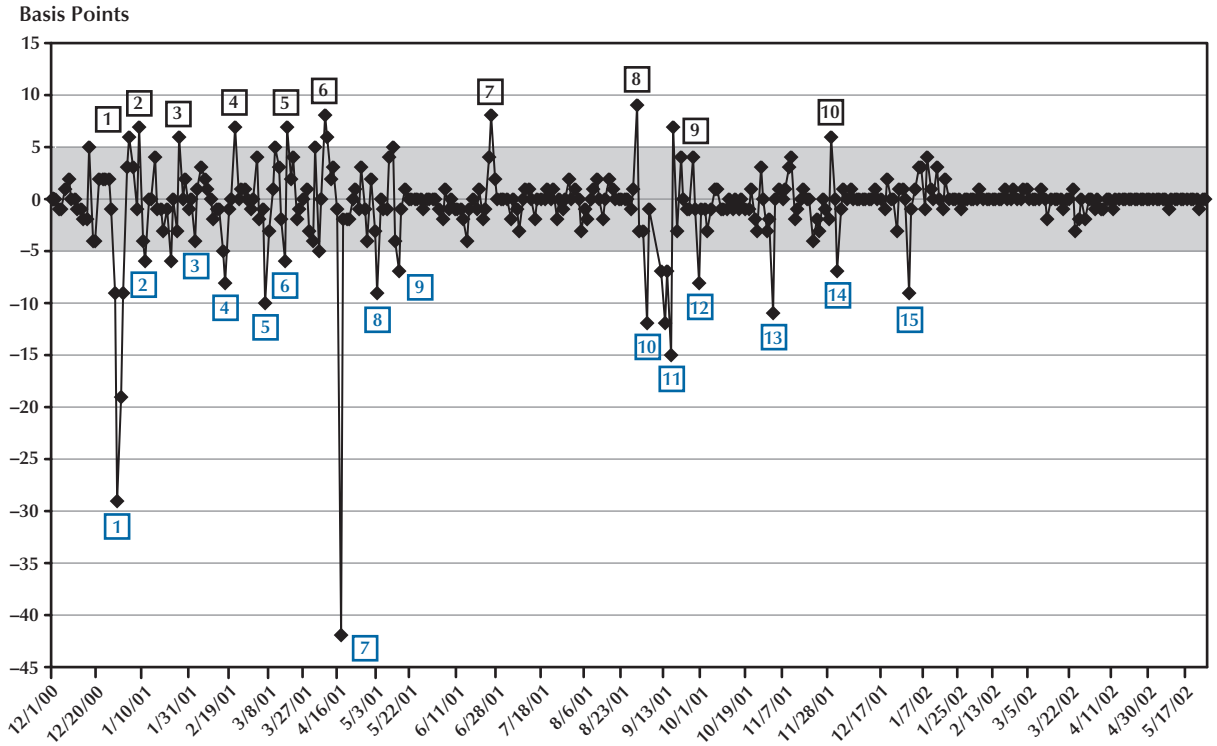
The conclusion from this graph is that the FOMC and market participants have been well synched in those circumstances when the FOMC believed that the incoming information on the economy was not sufficient to justify a policy action.

If market participants are well synched with the FOMC, then what types of information are providing the clues about future FOMC policy actions to the markets? Figure 3 is a case study of the period since the beginning of December 2000 through May 31, 2002. During this period the FOMC reduced the intended funds rate from 6.5 percent to 1.75 percent.

- The data plotted are the daily changes in yield on the one-month-ahead federal funds futures contract. There are a total of 374 observations.
- The area shaded in gray indicates a range of plus and minus 5 basis points in which we interpret the daily changes as merely ambient noise in the market.
- Fifteen observations (4.0 percent of the total) are positioned below the zero line in blue. These represent events where the funds rate futures contract fell by more than 5 basis points.
- Ten observations (2.7 percent of the total) are positioned above the zero line in black. These represent events where the rate rose by more than 5 basis points.

Figure 3

News Affecting Daily Fed Funds Futures Rate
December 1, 2000 – May 31, 2002



NOTE: Numbers above the zero line (in black, 1-10) indicate events where the federal funds futures rate rose by more than 5 basis points. Numbers below the zero line (in blue, 1-15) indicate events where the rate fell by more than 5 basis points. These numbers correspond to those in Table 1.

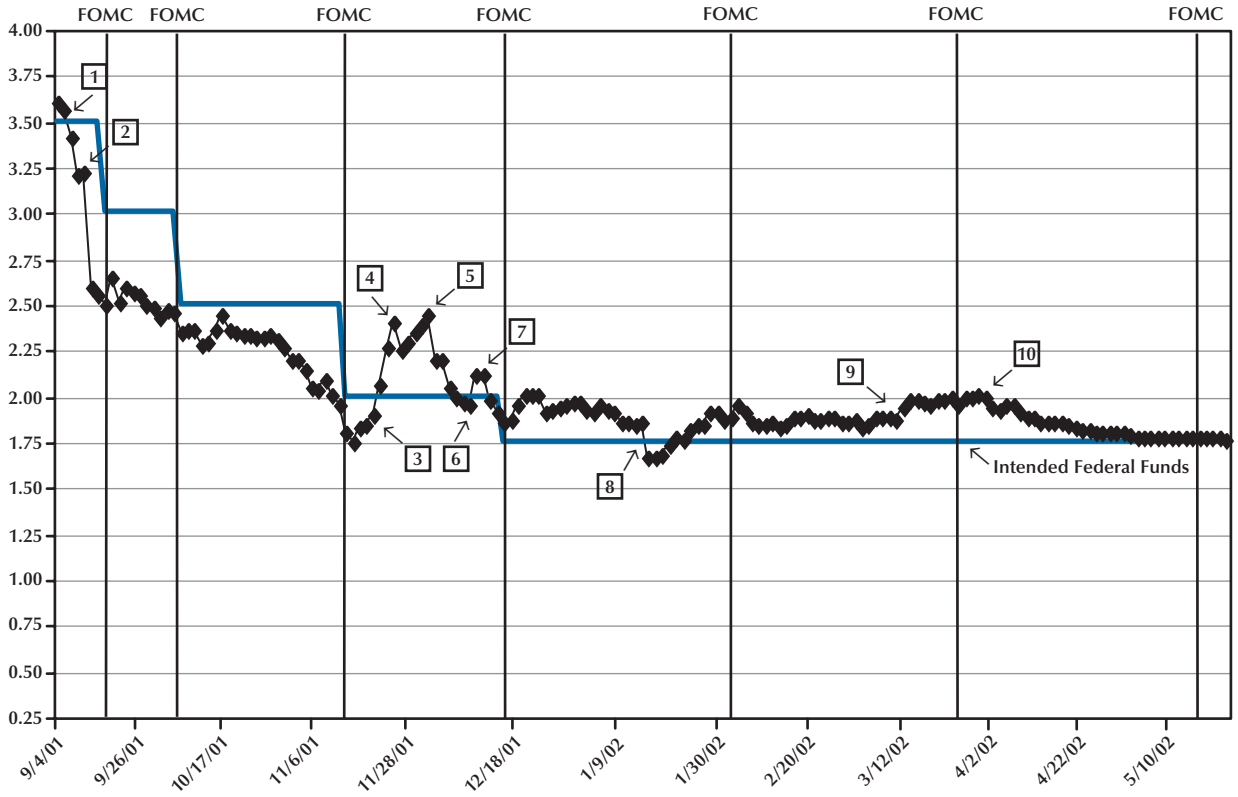
- The front page and the Credit Markets column in the *Wall Street Journal* have been checked for news associated with each of the twenty-five labeled events. The reports that appear there are indicated in Table 1. In four cases we have not found any "economic news" cited in either source. Six of the labeled changes are the FOMC actions noted in Figure 1 (excluding September 17, 2001, where simultaneously there is economic news, the intermeeting policy action, and the reopening of the equity markets after the terrorist attacks). Ten of the labeled changes are associated with the release of economic data, including four involving the release of employment data. Three of the labeled changes are associated with congressional testimony of Chairman Greenspan. One labeled change followed public remarks by other Federal Reserve officials. The remaining labeled change is the aftermath of the terrorist attack and intermeeting policy action of September 17, 2001.

The conclusions from Figure 3 are that (i) important news arrives relatively infrequently and (ii) the most significant news is FOMC actions (e.g., April 18, 2001; event 7, below zero line in blue), statements and testimony by FOMC members (e.g., January 11, 2002; event 15, below zero line in blue), or new economic data that market participants believe will affect future FOMC actions (e.g., September 7, 2001; event 10, below zero line in blue).

If markets are well synched with FOMC policy actions, then how far in advance are accurate forecasts formed? In some cases the lead-time is considerable. Figure 4 provides a case study using the June 2002 futures contract. In this graph, daily data on the level of the futures rate are plotted.

Figure 4

June 2002 Fed Funds Futures Rate



NOTE: Boxed numbers correspond to numbered events in Table 2.

- This contract began trading at the beginning of September 2001.
- The vertical lines indicate the days of FOMC meetings and policy actions between meetings.
- The blue line indicates the intended federal funds rate.

When the June 2002 contract initially traded, the then-prevailing 3.5 percent intended funds rate was anticipated to hold over the next ten months. This conviction eroded substantially upon the release of the August 2001 advanced retail sales and employment numbers (see event 1 in Table 2). Going into the terrorist attacks of 9/11, market participants saw a 3.25 percent intended funds rate in June 2002.

With the terrorist attacks, market expectations of the June 2002 intended funds rate were revised sharply downward to about 2.5 percent, well below the intended funds rate that prevailed over the remainder of September 2001 (see event 2 in Table 2). Expectations gradually eroded by a cumulative 75 basis points from mid-September until shortly after the November FOMC meeting, during which time the FOMC reduced the intended funds rate by 100 basis points in two steps.

With the news that the Taliban had left Kabul and the release of data on October retail sales in mid-November, expectations of the June 2002 intended funds rate were revised sharply upward to almost 2.5 percent (see event 3 in Table 2). This euphoria lasted only a few days until the release of data on new home construction in October (see event 4 in Table 2) and existing-home sales and consumer confidence (see event 5 in Table 2). At this time the then-prevailing intended funds rate of 2.0 percent was expected to continue until mid-2002.

The release of manufacturing data for November generated an upward revision of expectations of

Table 1

Futures Rate Changes and Reported News Events

Event	Date	Futures rate change	News reported
1	1/9/2001	0.06	No front-page reports 1/10/2001.
2	1/12/2001	0.07	"Retail sales inched up 0.1% in December, though downward revisions for October and November cancelled that slight gain. Core prices rose 0.3%." *WSJ* 1/15/2001, p. 1
3	2/1/2001	0.06	"The jobless rate edged up to 4.2% last month, its highest level since September 1999 but only a bit above the near 30-year-low of 4% set in December." *WSJ* 2/5/2001, p. 1
4	2/28/2001	0.07	"Greenspan dashed hopes for an imminent interest-rate cut, pushing stocks down. The Fed chairman told a House panel that recession poses a greater risk than inflation as consumer confidence continues to slide, suggesting that a rate cut is likely at the Fed's regular March 20 meeting. But he disappointed investors who had hoped for signs of an earlier reduction." *WSJ* 3/1/2001, p. 1
5	3/23/2001	0.07	No front-page reports 3/26/2001.
6	4/10/2001	0.08	No front-page reports 4/11-12/2001. "The bond market received a blow when Fed officials' remarks pointed to the chances of a recovery of the U.S. economy sooner rather than later, reducing hopes among some market participants that future rate cuts will be as aggressive as previously anticipated. William Poole, president of the Federal Reserve Bank of St. Louis, said that while the U.S. economy has slowed, 'weaker near-term prospects seem not to have dimmed the long-run outlook of robust growth'." *WSJ* 4/11/2001, p. C19
	4/11/2001	0.06	"In public appearances this week, Fed officials have sounded a generally upbeat tone on the economy, with some projecting an acceleration of growth after a weak first half. Analysts said that suggests the Fed isn't concerned enough about the economy or other factors to cut rates immediately." *WSJ* 4/12/2001, p. C17
7	6/27/2001	0.08	"The Fed cut interest rates for the sixth time this year, lowering its federal-funds target by a quarter point to 3.75%. Though the cut was the smallest this year, the central bank signaled it was poised to keep easing credit conditions. The Fed move didn't jar the market, even though many analysts had predicted a half-point cut." *WSJ* 6/28/2001, p. 1
8	9/4/2001	0.09	"The manufacturing sector appears to have turned a corner in August, as the NAPMs index of manufacturing activity showed significant improvement." *WSJ* 9/5/2001, p. 1
9	9/20/2001	0.07	"At a Senate hearing, Greenspan painted a grim picture of short-term economic weakness, citing weak corporate earnings and layoffs. A survey of economic forecasters said the economy is heading into a recession, and that it will last at least through the year." *WSJ* 9/21/2001, p. 1
10	12/5/2001	0.06	"Manufacturing is showing incipient signs of recovery for the first time in over a year. Meanwhile, the service sector rebounded last month after suffering its worst month on record in October." *WSJ* 12/6/2001, p. 1

Table 1 cont'd

Futures Rate Changes and Reported News Events

Event	Date	Futures rate change	News reported
1	1/2/2001	–0.09	"Manufacturing activity slowed last month to its weakest point in almost 10 years, as the NAPM index fell to 43.7 from 47.7 in November." *WSJ* 1/3/2001, p.1
	1/3/2001	–0.29	"The Fed cut a key interest rate, sending markets soaring. The central bank, in a rare move between meetings, lowered the federal funds target to 6.0% from 6.5%." *WSJ* 1/4/2001, p. 1
	1/4/2001	–0.19	"Most retail chains reported disappointing December sales, making the holiday shopping season the worst in at least five years." *WSJ* 1/5/2001, p. 1
2	1/18/2001	–0.06	"Housing starts edged up last month but applications for building permits fell, suggesting a further slowdown." *WSJ* 1/19/2001, p. 1
3	1/30/2001	–0.06	"Consumer confidence plunged in January, cementing expectations that the Fed will cut rates by half a point and sparking hopes of an even bigger cut." *WSJ* 1/31/2001, p. 1
4	2/23/2001	–0.08	No front-page reports 2/26/2001.
5	3/14/2001	–0.10	No front-page reports 3/15/2001.
6	3/22/2001	–0.06	"Leading economic indicators fell for the fourth time in five months in February, but still didn't point to a recession." *WSJ* 3/23/2001, p. 1
7	4/18/2001	–0.42	"The Fed cut short-term interest rates by a half point in a surprise move that sent stocks soaring." *WSJ* 4/19/2001, p. 1
8	5/4/2001	–0.07	"Unemployment jumped to 4.5% in April from 4.3% the month before, raising fears that consumers will curtail spending and spark a recession." *WSJ* 5/7/2001, p. 1
9	5/15/2001	–0.07	"The Fed cut short-term rates by half a point, its fifth big rate reduction in as many months, and did nothing to signal that it is ending its campaign to jump-start the economy." *WSJ* 5/16/2001, p. 1
10	9/7/2001	–0.12	"The surge in unemployment is raising fears that the business cycle may be entering a new and harrowing phase." *WSJ* 9/10/2001, p. 1
11	9/14-19/2001	–0.41	September 11, 2001, terrorist attack on World Trade Center
12	10/2/2001	–0.08	"The Fed cut the target for its federal-funds rate to 2.5% from 3% and left the door open to further rate cuts, as it continued an aggressive campaign to stimulate the economy." *WSJ* 10/3/2001, p. 1
13	11/6/2001	–0.11	"The Fed cut interest rates by half a point to their lowest level since 1961 and, citing a deteriorating economy, suggested more cuts could be in store." *WSJ* 11/7/2001, p. 1
14	12/7/2001	–0.07	"A rise in the jobless rate last month to its highest level in over six years damped predictions that an economic recovery has begun. Economists expect the Fed to lower rates again tomorrow." *WSJ* 12/10/2001, p. 1
15	1/1/2002	–0.09	"Greenspan said the economy shows signs of stabilizing but still faces major risks before a sustainable recovery can begin. The downbeat assessment raises the odds the Fed again will cut interest rates at its meeting this month." *WSJ* 1/14/2002, p. 1

NOTE: The first 10 numbers (corresponding to the upper numbers in Figure 3, in black) indicate events where the funds rate futures contract rose by more than 5 basis points. The next 15 numbers (corresponding to the lower numbers in Figure 3, in blue) indicate events where the rate fell by more than 5 basis points.

Table 2

Futures Rate Changes and Reported News Events

Event	Date	Futures rate change	News reported
1	9/6/2001	–0.15	"Discount stores performed well in August, but specialty-apparel retailers and high-end department stores suffered." *WSJ* 9/7/2001, p. 1
	9/7/2001	–0.20	"The surge in unemployment is raising fears that the business cycle may be entering a new and harrowing phase." *WSJ* 9/10/2001, p. 1
2	9/13/2001	–0.63	September 11, 2001, terrorist attack on World Trade Center
3	11/13/2001	0.06	"Rebels Seize Kabul As Taliban Forces Flee Afghan Capital" *WSJ* 11/14/2001, p. 1
	11/14/2001	0.16	"Retail sales shot up a record 7.1% in October. The surge was led by a 26.4% jump in auto sales, which were aided by zero-percent financing and other incentives." *WSJ* 11/15/2001, p. 1
	11/15/2001	0.21	—
	11/16/2001	0.13	"Consumer prices slipped in October amid continued drops in energy prices, a possible positive sign for reigniting spending. But industrial output fell for the 13th straight month, the longest string of declines since the Depression." "Hiring plans are approaching a weakness not seen since the recessionary early months of 1991—Manpower's survey of nearly 16,000 companies says." *WSJ* 11/19/2001, p. 1
4	11/19/2001	–0.15	"New-home construction fell 1.3% in October and builders requested permits at the slowest pace in four years, another sign that the housing market is slowing." *WSJ* 11/20/2001, p.1
5	11/27/2001	–0.25	"Existing-home sales rose 5.5% last month after a weak September. But consumer confidence, hurt by layoffs, slid in November to an eight-year low." *WSJ* 11/28/2001, p. 1
6	12/5/2001	0.16	"Manufacturing is showing incipient signs of recovery for the first time in over a year. Meanwhile, the service sector rebounded last month after suffering its worst month on record in October." *WSJ* 12/6/2001, p. 1
7	12/7/2001	–0.14	"A rise in the jobless rate last month to its highest level in over six years damped predictions that an economic recovery has begun. Economists expect the Fed to lower rates again tomorrow." *WSJ* 12/10/2001, p. 1
8	1/11/2002	–0.19	"Greenspan said the economy shows signs of stabilizing but still faces major risks before a sustainable recovery can begin. The downbeat assessment raises the odds the Fed again will cut interest rates at its meeting this month." *WSJ* 1/14/2002, p. 1
9	3/7/2002	0.07	"Greenspan gave the Senate a considerably more upbeat assessment of the economy than he did in House testimony last week. The Fed chairman said recent evidence suggests 'an economic expansion is already well under way'." *WSJ* 3/8/2002, p. 1
10	3/26/2002	–0.06	"Consumer confidence surged in March to its highest level since before the Sept. 11 attacks, suggesting the U.S. may enjoy a broad economic recovery." *WSJ* 3/27/2002, p.1

the June 2002 intended funds rate (see event 6 in Table 2), but this expectation was reversed when November employment data became available two days later (see event 7 in Table 2).

From the December 2001 FOMC meeting until the end of May 2002, the June 2002 contract traded in the range of 1.75 to 2.0 percent, with the exception of a couple of days in January. The yield briefly dropped below 1.75 percent after the January 11, 2002, Congressional testimony of Chairman Greenspan, which was widely interpreted as pessimistic and as a signal that an additional cut in the intended funds rate might be forthcoming (see event 8 in Table 2). This effect was quite short-lived, and within a few days the yield was back within the 1.75 to 2.0 percent range. After the Chairman's Senate testimony on March 7, 2002, the yield moved to 2.0 percent, indicating a conviction that no later than the May 2002 FOMC meeting the intended funds rate would be raised by 25 basis points (see event 9 in Table 2). Between the March FOMC meeting and mid-April, this conviction gradually eroded, and for the month prior to the May FOMC meeting a firmly held conviction prevailed in the market that no change in the intended funds rate would occur before the June FOMC meeting.

We conclude, from the small average size of market surprises concerning FOMC policy changes, that in recent years the market has had an excellent understanding of what the FOMC is doing. For the most part, rate changes occur in response to news that *should* change rates. These findings, we believe, provide strong evidence of the payoff from greater Fed transparency and greater regularity in monetary policy actions.

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A Look Inside Two Central Banks: The European Central Bank and the Federal Reserve

Patricia S. Pollard

Central banks have existed since the Swedish Riksbank began operation in 1668. The Federal Reserve, which was created in 1913, is thus a relative newcomer in the history of central banking: At the time of its creation, however, only 20 other central banks existed. The number of central banks rose rapidly in the post-World War II period primarily as a result of decolonization. This number expanded again in the early 1990s as the collapse of the Soviet Union led to the establishment of central banks by the former Soviet republics. By 1997 there were 172 central banks.[1] In 1998 the coterie of central banks expanded by one, when the European Central Bank (ECB) became the newest member.

Central banking has changed greatly since its early history, when the primary function of a central bank was to act as the government's banker. Broz (1998) argues that financing military endeavors was the main reason for the establishment of the early central banks, pointing out that all "central banks in existence before 1850 were chartered in the context of war."[2]

By the time the Federal Reserve was established, the role of the central bank had evolved to focus primarily on providing stability in banking and financial systems. At this point, no mention had been made of monetary policy. The Federal Open Market Committee (FOMC), the policymaking group of the Federal Reserve, was not created until 1933.[3]

Today the primary function of a central bank is, in fact, monetary policy. Moreover, it is widely accepted that a central bank needs to be able to operate independently within the government to best achieve its monetary policy goals. The statutes governing the ECB reflect these shifts and establish monetary policy as the primary function of the ECB, with many other tasks being delegated to the national central banks. The 1993 Maastricht Treaty amendments to the Treaty Establishing the European Community required that not only the ECB, but also the national central banks, be independent. In the 10 years since the Maastricht Treaty was signed, increasing attention has focused on counterbalancing central bank independence with accountability and transparency.

This article examines modern central banking with a focus on the world's two most prominent central banks—the Federal Reserve System and the European Central Bank.[4] First, it examines the structure and appointment process of the key policymakers at the central banks. Next, it highlights the tasks of the central banks, focusing on the monetary policy process. The goals and tools of monetary policy as well as the decisionmaking process and how they differ in each system are discussed. Finally, the article examines accountability and transparency in the Federal Reserve and the ECB.

STRUCTURE OF THE ECB AND THE FEDERAL RESERVE

On June 1, 1998, the Executive Board of the ECB held its first meeting at its headquarters in Frankfurt, Germany. Six months later the ECB assumed responsibility for monetary policy in the euro area, bringing to fruition a plan for monetary union first outlined nearly two decades earlier.[5]

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[1] See Pringle (2002).

[2] Broz (1998, p. 239).

[3] In 1923 the Federal Reserve Banks of Boston, Chicago, Cleveland, New York, and Philadelphia established an Open Market Investment Committee to coordinate open market operations conducted by these Reserve Banks. In 1930 this was replaced by the Open Market Policy Conference consisting of the heads of all 12 regional Banks and the members of the Board of Governors. It was not until the 1935 amendment to the Federal Reserve Act that the regional Banks were prohibited from conducting independent open market operations. See Meulendyke (1998) for more details.

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[4] The United States and the euro area account for 37 percent of world output (International Monetary Fund, 2002, Statistical Appendix Table A).

[5] See the boxed insert "The Path to Monetary Union."

THE PATH TO MONETARY UNION

In March 1957, six countries—Belgium, France, Germany, Italy, Luxembourg, and the Netherlands—signed the Treaty of Rome, creating the European Economic Community. The main focus of the treaty was the creation of a customs union among the member countries.[1] Coordination of monetary and fiscal policies was mentioned by the Treaty as important to the well-functioning of a customs union. The coordination of general economic policies took place through meetings of the Council of Economics and Finance Ministers. In 1964 the Committee of Central Bank Governors was established to coordinate monetary polices in the member states. This was primarily a forum for exchanging information.

In the late 1960s economic and monetary coordination received greater focus, partly in response to the success of the customs union and partly in response to the emerging turbulence in the Bretton Woods fixed exchange rate system.[2] In 1970 the Council of the European Communities established a committee to discuss economic and monetary union. The group, led by Pierre Werner, the Prime Minister of Luxembourg, issued a report advocating a three-stage movement to economic and monetary union by the end of the decade. Although the Council initially supported the plan, the economic instability resulting from the collapse of the Bretton Woods system and the oil crisis in the early 1970s led to its demise. It was not until 1988 that another committee was established to address the issue of monetary and economic union, this time led by Jacques Delors, the head of the European Commission.

During the 18-year interval, many changes had occurred. The European Community went through three expansions, incorporating six new members.[3] In 1979 the European Monetary System (EMS) created a fixed exchange rate system in which all member currencies, except the pound sterling, participated. Despite frequent adjustments to the exchange rates in the early years, the success of the EMS in reducing exchange rate variability and the willingness of countries to adopt the economic policies necessary to stabilize exchange rates led to a renewed commitment toward economic and monetary integration. Economic integration was furthered by the passage of the Single European Act in 1987, which called for the creation of a free market in the movement of goods, services, and capital by 1993. The creation of a single European market, it was argued, would be hampered by fluctuations in exchange rates as well as the costs of exchanging currencies.

In April 1989 the Delors committee released its report. Like the Werner report, it called for a three-stage process to achieve economic and monetary union within a decade.[4] The culmination of the process would be the creation of a supranational institution to set monetary policy and a single currency.

In December 1991, the European Council finalized an agreement on changes to the Treaty of Rome to attain economic and monetary union.[5] The amendments (often referred to as the Maastricht Treaty, after the Dutch town where the agreement was reached) came into effect in November 1993 following ratification by the member states.[6]

In January 1995, Austria, Finland, and Sweden entered the European Union, bringing the membership to 15. In May 1998, 11 countries (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain) were certified as having met the membership criteria for admission to monetary union and became members effective January 1, 1999.[7] Greece met the membership criteria in 2000 and became the 12th member in January 2001.

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[1] A customs union is characterized by free trade among the member countries in conjunction with a common external tariff and common trade policy toward nonmember countries.

[2] For a more detailed discussion of the historical development of monetary union in Europe, see Arestis, McCauley, and Sawyer (1999).

[3] Denmark, Ireland, and the United Kingdom joined in 1973; Greece in 1981; and Portugal and Spain in 1986.

[4] The Werner report called for greater integration of fiscal policies than did the Delors report. The former envisioned the transfer of national budgetary powers to the European Community (see Wellnik, 1997).

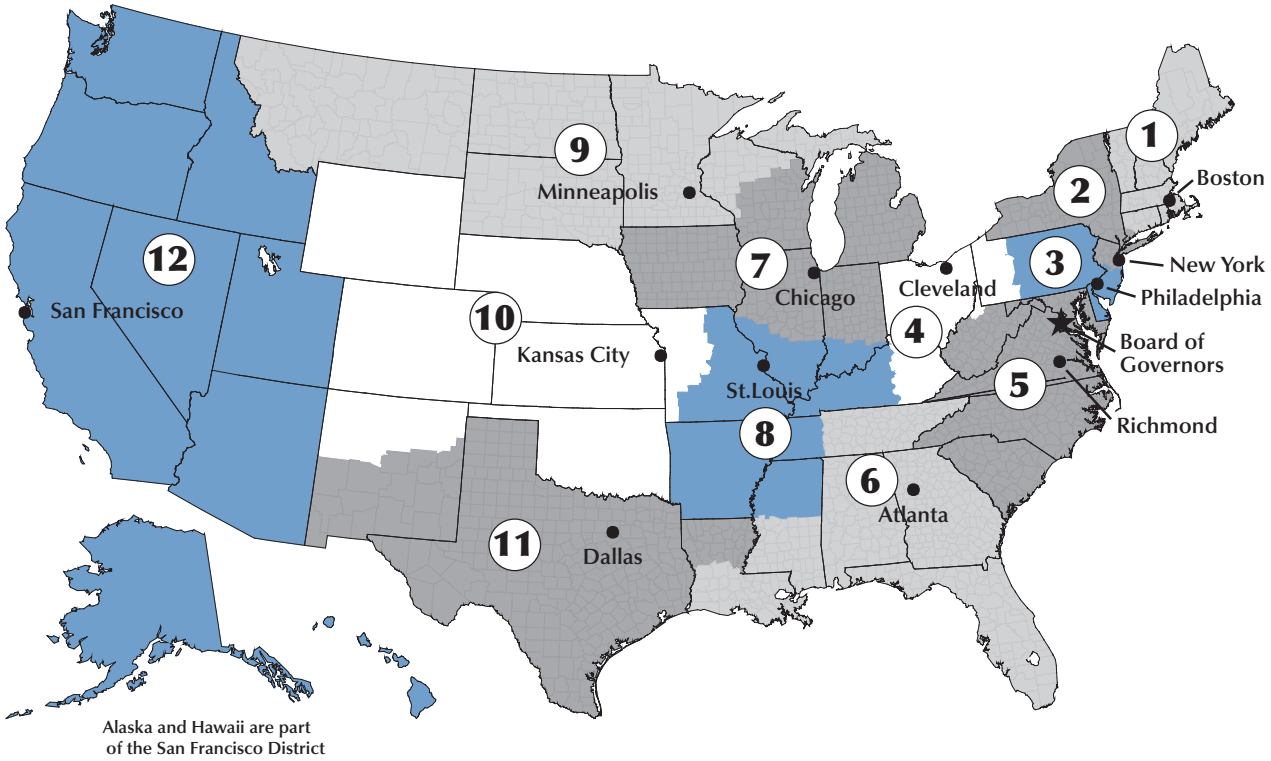
[5] The United Kingdom supported the changes only after it was given the right to opt out of monetary union.

[6] Denmark rejected the Maastricht Treaty in a referendum. A second referendum passed after Denmark was also given the right to opt out of monetary union.

[7] Denmark and the United Kingdom exercised their rights to opt out of monetary union. Sweden guaranteed its lack of fitness for membership by failing to join the exchange rate mechanism of the European Monetary System. For a discussion of the membership criteria for monetary union, see Pollard (1995).

Figure 1

The Federal Reserve System



The euro area is unique among common-currency areas. Twelve sovereign nations have not only adopted a common currency, the euro, but have also created a supranational organization, the ECB; this institution, along with input from the head of each member country's national central bank, sets monetary policy for the euro area.

Ninety years ago, the Federal Reserve Act created a central bank for the United States consisting of 12 regional (District) Federal Reserve Banks (Figure 1) and a seven-member Federal Reserve Board in Washington, D.C.[6] In 1935 the Federal Reserve Board was renamed the Board of Governors of the Federal Reserve System.

The European System of Central Banks consists of 15 national central banks (Figure 2) and a six-member Executive Board in Frankfurt, Germany. The 15 central banks correspond to the 15 member countries of the European Union. The three central banks whose countries are not members of the euro area participate in few of the activities of the European System of Central Banks. The Eurosystem is the term used to refer to the ECB and the 12 national central banks of the member countries.[7]

The 12 Districts of the Federal Reserve System, in contrast to the national central banks of the Eurosystem, do not correspond to political entities. These 12 Districts are divided along county lines, encompassing not only multiple states, but portions of states. Indeed, in the early years of the Federal Reserve System, some border counties petitioned and were allowed to switch Districts.[8]

Appointments to the Board of Governors and Executive Board

The members of the Board of Governors of the Federal Reserve System are nominated by the

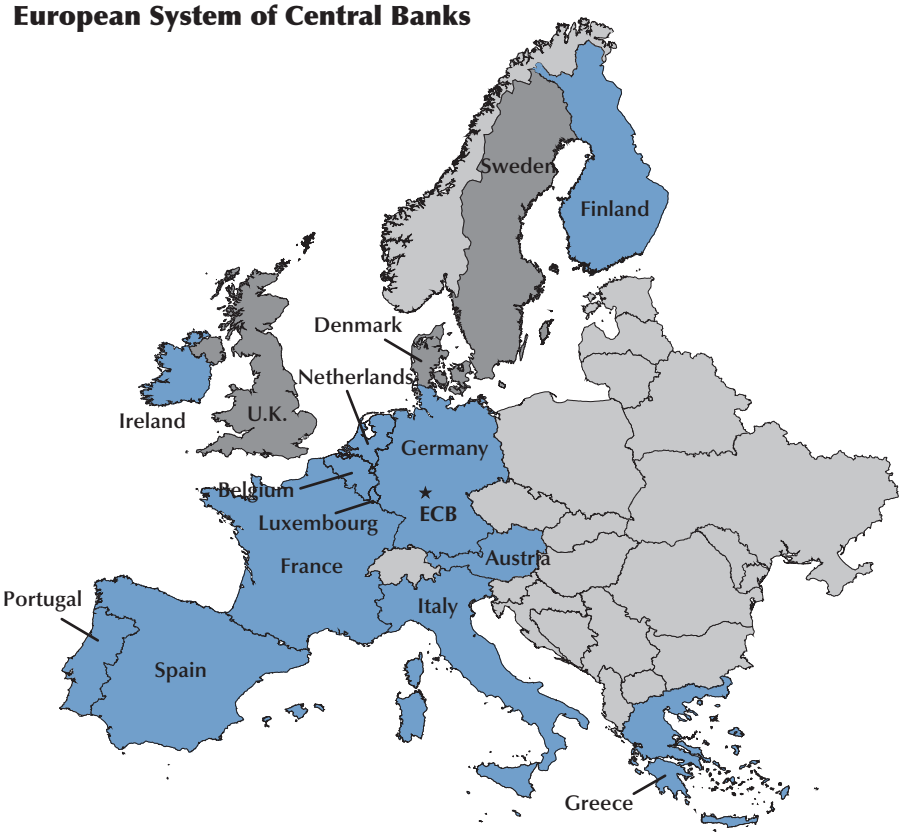
[6] The Federal Reserve Act specified that there be "not less than eight nor more than twelve" Districts (Section 2.1); the text appears at <fedweb.frb.gov/fedweb/board/legal/lawlib/law-fra.htm>.

[7] These countries are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. Denmark, Sweden, and the United Kingdom are the three nonmembers.

[8] See Federal Reserve Bank of Minneapolis (1988), Hammes (2001), and Primm (1989) for more details on the creation of the 12 Districts.

Figure 2

European System of Central Banks



NOTE: Only the central banks of the blue shaded countries are members of the Eurosystem.

President of the United States and must be confirmed by the U.S. Senate. The chairman and vice chairman are appointed by the President and confirmed by the Senate from among the members of the Board, although appointment to these roles may be simultaneous with appointment to the Board.

In Europe the governments of all the member states of the euro area must agree on the appointments to the Executive Board. The process begins with a recommendation by the Council of Economics and Finance Ministers (ECOFIN).[9] Since ECOFIN comprises the finance ministers of the member countries of the European Union, its recommendations will reflect the consensus of the member governments. Once ECOFIN makes its recommendation, the European Parliament and the Governing Council of the ECB are consulted.[10] Following these consultations the appointments are confirmed by the heads of state or government of the euro area members.

The Federal Reserve Act and the Maastricht Treaty both briefly mention qualifications for membership on the respective boards. The Federal Reserve Act specifies that

> In selecting the members of the Board, not more than one of whom shall be selected from any one Federal Reserve district, the President shall have due regard to a fair representation of the financial, agricultural, industrial, and commercial interests, and geographical divisions of the country. (Section 10.1)

[9] See the boxed insert "Institutions of the European Union."

[10] The Governing Council consists of the members of the Executive Board and the heads of the 12 central banks in the euro area.

INSTITUTIONS OF THE EUROPEAN UNION[1]

Four institutions of the European Union are mentioned throughout the text. They are the European Commission, the Council of the European Union, the European Council, and the European Parliament.

The *European Commission* is the executive branch of the European Union government. The president of the Commission is nominated by the European Council and approved by the European Parliament. The European Council in consultation with the President of the Commission chooses the other 19 commissioners. The European Parliament must reject or accept the proposed Commission, but may not reject individual members. The appointments to the 20-member commission are based on nationalities. France, Germany, Italy, Spain, and the United Kingdom each are allocated two commissioners with the remaining ten EU countries each allowed one appointment.[2] All commissioners serve a five-year renewable term. The Commission has four main roles: (i) initiate policies by proposing legislation to the Council and European Parliament; (ii) administer and implement European Union policies; (iii) enforce European Union laws; and (iv) represent the European Union internationally, particularly in negotiations regarding trade and cooperation.

During their term in office the commissioners are expected to represent the interests of the European Union and not those of their home countries. In contrast, the *Council of the European Union* (usually referred to as the Council) represents the national governments. The composition of the Council changes depending upon the issue being considered. For example, the agricultural ministers of the member states address issues related to the Common Agricultural Policy. The Council of Economics and Finance Ministers coordinates the economic policies of the member states.

The Council is the main decisionmaking body of the European Union. Each country is allocated a number of votes based loosely on the size of its population. The Council enacts European Union laws stemming from proposals submitted by the Commission. Most decisions are made by a qualified majority vote, which requires 62 of 87 votes or in some cases 62 votes from at least ten member countries. Some policies such as tax measures and foreign policy require unanimity.

The *European Council* consists of the heads of state or government of the 15 member countries and the president of the European Commission (as a non-voting member). It is not legally an institution of the European Union but plays a key role. The presidency of the European Council rotates among the member states on a six-month basis. The European Council meets at least twice per year (in June and December). Decisions are generally reached through consensus.

The *European Parliament* is the other legislative institution of the European Union. Its 626 members are directly elected for five-year terms. Although elected nationally, the members of Parliament are grouped according to party affiliation and not nationality. Although the Parliament shares some legislative powers with the Council, its main purpose is to exercise democratic control over European Union institutions.

[1] Information in this section comes from European Communities (1995-2002) and European Parliament (2001).

[2] Under the Treaty of Amsterdam the number of commissioners from any member country will be limited to one, at most, as the European Union expands eastward.

The treaty establishing the ECB set no such requirement for regional or national diversity, simply stating that "only nationals of Member States may be members of the Executive Board" (Article 112).[11] The treaty did set further qualifications for the Board members, stating that they must be "persons of recognized standing and professional experience in monetary or banking matters" (Article 112).

In practice, the regional restriction placed by the Federal Reserve Act is loosely applied. For example, the two most recently appointed members, Ben Bernanke and Donald Kohn, represent the Atlanta and Kansas City Districts, respectively. Neither lived nor worked in these Districts at the time of his appointment. What then is the link with the Districts they represent? Bernanke was born in Georgia and Kohn worked at the Federal Reserve Bank of Kansas City in the early 1970s.

[11] The articles listed in the text refer to the Treaty Establishing the European Community as amended by the Treaty of Amsterdam in 1997.

The appointments to the Executive Board of the Eurosystem, however, have thus far been made to ensure national diversity. Indeed, given that there are only half as many positions on this Board as there are current euro area member countries and that the ratio will decline as more countries achieve membership, it is unlikely that there will ever be two Board members appointed from the same country.

Currently, all the members of the Executive Board are experienced central bankers, each having served on the staff of his or her national central bank.[12] Despite the requirement that the members of the Fed's Board of Governors should reflect a range of interests, in recent years they have been primarily economists and/or bankers.[13]

Term of Office. Members of the Board of Governors are appointed for a 14-year term, nearly twice as long as the eight-year term for members of the Executive Board. Both are nonrenewable. The actual term for a member of the Board of Governors could, however, be much longer: If a member resigns prior to the end of the term of office, the new member is appointed to serve the remainder of the term and then can be appointed to a full 14-year term.[14] Alan Greenspan, for example, was appointed in 1987 to fill the remaining years of Paul Volcker's term and was reappointed in 1992 to a 14-year term.

The chairman and vice chairman of the Board of Governors serve four-year terms that may be renewed as long as their terms on the Board have not expired. Renewal requires nomination by the President of the United States and the consent of the U.S. Senate. On the Executive Board, the president and vice president are appointed for the full eight-year nonrenewable term.

The terms of members on both Boards are staggered to provide continuity.[15] In the United States, however, few members now serve the full 14 years and the appointment process is sometimes slow, so multiple vacancies may occur. All members of the current Board of Governors, with the exception of the Chairman, were appointed within the last five years, and four members were appointed in the last two years. Figures 3 and 4 show the current members of the Board of Governors and the Executive Board, respectively, along with the District or country they represent and the expiration date of their terms.

Appointments of the District Bank Presidents and the Governors of the National Central Banks

The president of a Federal Reserve Bank is appointed by the board of directors of that Bank, subject to the approval of the Board of Governors. The term of office of all the presidents expires on the same date, the last day of February in years ending with a 1 or 6. The president may be reappointed for an indefinite number of five-year terms, subject to the following restrictions: mandatory retirement at age 65 if appointed at or before age 55 or mandatory retirement at age 70 or a 10-year term (whichever comes first) if appointed after age 55.[16] There is no requirement that the president be a resident of the District prior to appointment.

The appointment of the governor of each national central bank in the euro area is determined by the respective national government. The Maastricht Treaty requires that the term of office be a minimum of five years. The term varies across countries from five to eight years.[17] Eight of the 12 countries allow for a renewable term. The Executive Board need not be consulted and has no veto power over these appointments.

Tasks of the Central Banks

Apart from conducting monetary policy, central banks have a variety of other tasks. These other duties are often related to the monetary policy function. In general the duties of the Federal Reserve and the Eurosystem (listed in Table 1) are similar, yet there are some key differences.[18]

Both central banks are the sole issuer of banknotes for their respective economies. In the euro area, production and distribution is controlled by

[12] Brief biographies of the members of the Executive Board are available at < www.ecb.int/about/ab1mem.htm > .

[13] Brief biographies of the members of the Board of Governors are available at < www.federalreserve.gov/bios > .

[14] Since the 1935 amendment to the Federal Reserve Act restricted future appointees to the Board of Governors to one full term, the longest anyone has served is 21 years.

[15] To achieve this in the ECB, the terms of office were set at two to eight years for the initial Executive Board members.

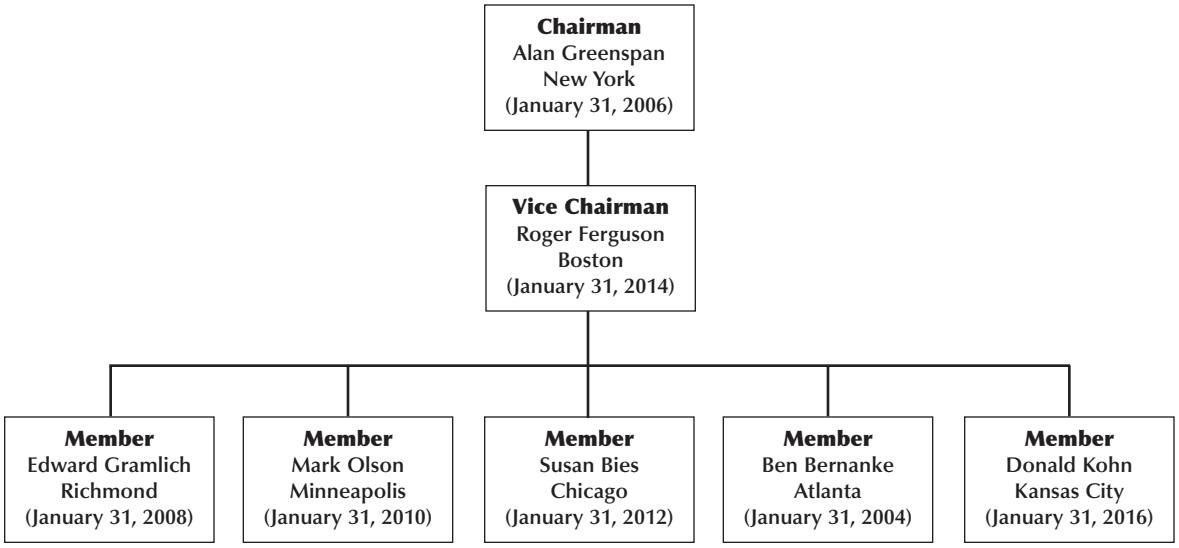
[16] No such age restriction applies to members of the Board of Governors. Alan Greenspan, for example, will be 78 when his current term as Chairman expires in 2004.

[17] The term is five years in Austria, Belgium, Italy, and Portugal; six years in France, Greece, Luxembourg, and Spain; seven years in Finland, Ireland, and the Netherlands; and eight years in Germany.

[18] See Board of Governors (1994) for a more detailed description of the tasks of the Federal Reserve System.

Figure 3

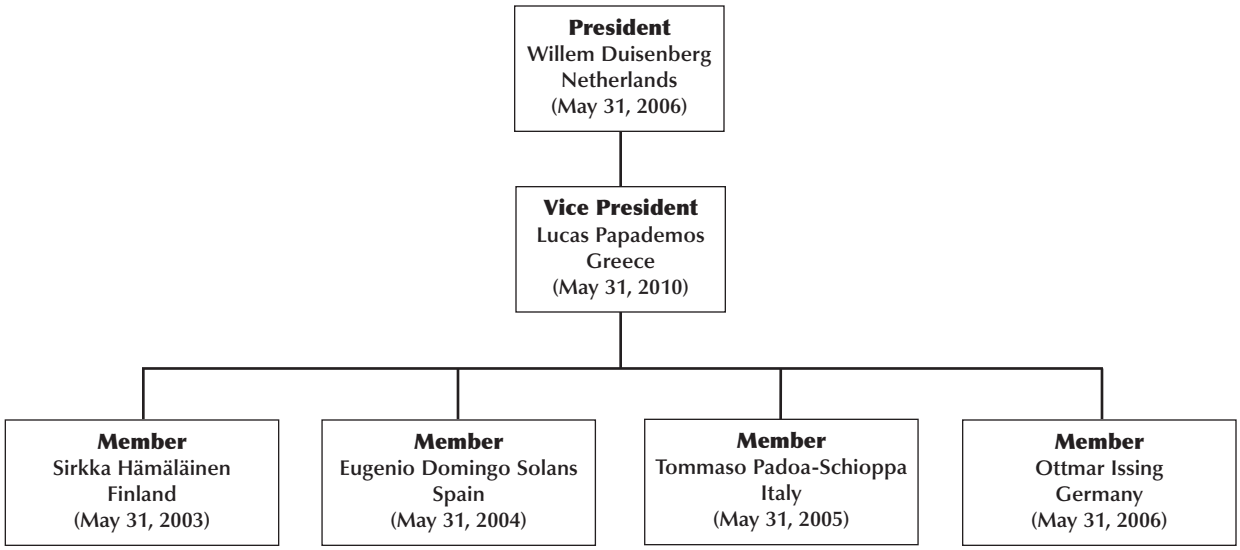
Members of the Board of Governors



NOTE: Date indicates expiration of term.

Figure 4

Members of the Executive Board



NOTE: Date indicates expiration of term.

Table 1

Tasks of the Federal Reserve System and European System of Central Banks

	FRS	ESCB
Define and implement monetary policy	Yes	Yes
Issue banknotes	Yes	Yes
Conduct foreign exchange operations	Yes	Yes
Hold and manage official reserves	Yes	Yes
Act as the fiscal agent for the government	Yes	NCBS
Promote stability of financial system	Yes	Yes
Supervise and regulate banks	Yes	Some NCBS
Implement consumer protection laws	Yes	Some NCBS
Promote the smooth operation of the payments system	Yes	Yes
Collect statistical information	Yes	Yes
Participate in international monetary institutions	Yes	Yes

NOTE: NCBS refers to national central banks of the Eurosystem.

the ECB with production occurring in all 12 member countries. In the United States, Federal Reserve notes are produced by the Bureau of Engraving and Printing (part of the U.S. Treasury Department) under the direction of the Board of Governors. Federal Reserve notes are then purchased at cost, not face value, by the Federal Reserve Banks. Production takes place in only two locations—Fort Worth, Texas, and Washington, D.C.

Neither the ECB nor the Federal Reserve is responsible for exchange rate policy (for example, deciding whether to enter into a fixed exchange rate arrangement). This responsibility lies with ECOFIN in the euro area and the Treasury Department in the United States. ECOFIN is required, however, to consult the ECB before entering into any exchange rate arrangements and must not allow such arrangements to take precedence over the ECB's price stability objective (Article 111). Both central banks, however, may intervene in foreign exchange markets and may hold and manage foreign currency reserves.

Both central banks provide financial services to the government. These tasks are primarily handled by one of the Reserve Banks in the United States, currently the Federal Reserve Bank of St. Louis. In the euro area each national central bank serves as fiscal agent for its own government. There are limitations placed on the fiscal agency function of both central banks to prevent the government from using this relationship to finance budget deficits. For example, both the Federal Reserve and the European System of Central Banks are prohibited from extending loans to the government or from directly purchasing securities from the government.

Because of the key role the financial system plays in the economy, maintaining the stability of the financial system is an important objective of both central banks. The Federal Reserve plays a role in supervising and regulating banks to this end. It shares supervisory tasks with three federal agencies and with state agencies. In addition the Federal Reserve shares tasks with foreign agencies in supervising U.S. banks with branches abroad and foreign bank branches in the United States.

The Federal Reserve serves as a bank regulator in setting standards regarding the operations and activities of banks. As a complement to this regulation, the Federal Reserve implements consumer protection laws in the area of credit and financial transactions.

The European System of Central Banks has no direct role in banking supervision. The Maastricht Treaty simply states that it

> shall contribute to the smooth conduct of policies pursued by the competent authorities relating to the prudential supervision of credit institutions. (Article 105)

Responsibility for supervision in the euro area is determined nationally. Although most national central banks have some role in supervision, several

countries have followed or are considering following the lead of the United Kingdom in removing supervision from the functions of the central bank. The ECB has argued for expanding the supervisory role of the national central banks, as well as increasing cooperation among those banks (ECB, 2001b).[19] In April 2001 the European System of Central Banks reached an agreement with the banking supervisory authorities in the European Union countries to increase cooperation.[20]

An important task related to supervision is the role of the central bank as a lender of last resort. The Federal Reserve can use the discount window (discussed here later) to make loans to banks that are, although solvent, temporarily illiquid. The Maastricht Treaty does not mention a lender of last resort function for the ECB, and the ECB has been criticized for lacking this function.[21] Perhaps as a result of this criticism, although it remains silent about the specifics, the ECB has reiterated that it has the ability and the willingness to handle a liquidity crisis in the euro area banking system. Willem Duisenberg, president of the ECB, said the following in response to a question regarding the role of the ECB as a lender of last resort: "The Governing Council has this issue well under control but will never make anything public in this regard" (Duisenberg, 1998). Tommaso Padoa-Schioppa, a member of the Executive Board, stated that

> To the extent that there would be an overall liquidity effect that is relevant for monetary policy or a financial stability implication for the euro area, the Eurosystem itself would be actively involved. (Padoa-Schioppa, 1999)

Financial regulation and consumer protection in credit and financial matters generally remains at the national level in the Eurosystem, although the European Union is looking at ways to establish regulations both to promote financial integration and handle the regulatory complications resulting from such integration.

The role of the central bank in overseeing the payments system is linked to both its role in ensuring the stability of the financial system and its conduct of monetary policy. The Protocol on the Statute of the European System of Central Banks and of the European Central Bank permits the ECB and the national central banks operational roles in the payments system and gives the ECB the authority to make regulations to "ensure efficient and sound clearing and payment systems" (Article 22). National central banks also provide oversight for payment and clearing systems operated by private entities. In preparation for monetary union, domestic payments systems were required to meet minimum standards. The ECB operates TARGET, a real-time gross settlement system to aid in central bank operations and the settlement of cross-border and large-value euro payments in the euro area.[22] The Federal Reserve both operates clearing and payments systems and oversees those operated by private entities.

Both central banks cooperate internationally, generally through the Bank for International Settlements, in working to minimize the risk of problems arising in cross-border payments. International cooperation extends to other areas of central banking, particularly in issues related to financial stability and monetary policy. Central bankers from the ECB and the Federal Reserve participate in meetings of the international monetary institutions as well as less formal forums for discussion.

Both central banks collect and publish data related to banking and monetary aggregates, as well as other indicators of economic activity. These data are particularly useful in the central banks' task of implementing monetary policy. Interestingly, neither central bank collects the data used to measure inflation. These data are constructed by the Bureau of Labor Statistics in the United States and Eurostat in the European Union.

MONETARY POLICY

The main function of both the Federal Reserve and the ECB is to conduct monetary policy to achieve the goals assigned by their respective charters. This section begins with a discussion of these goals, followed by an analysis of the tools available to the two central banks in conducting monetary policy. It then turns to the monetary policy decision process, looking at both the differences in the decisionmaking bodies in the United States and the euro area and the process by which decisions are made.

[19] This document provides an overview of the debate regarding the role of central banks in banking supervision.

[20] See ECB (2001a).

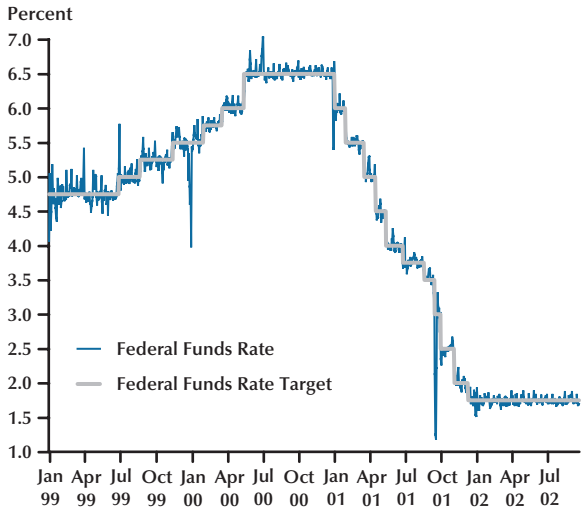
[21] See, for example, Bordo and Jonung (1999) and Prati and Schinasi (1998).

[22] For more details on payment and clearing systems in the euro area, see ECB (2001b).

Figure 5

Federal Funds Target and Effective Rate

January 1, 1999, to September 20, 2002



Monetary Policy Goals

The primary goal of the Eurosystem as set forth by the Maastricht Treaty is to "maintain price stability" (Article 105.1). The treaty further instructs the Eurosystem to "support the general economic policies" (Article 105.1) in the euro area without prejudice to the goal of price stability. Thus, the treaty makes it clear that any other objectives are secondary to that of price stability.

The ECB has given a quantitative definition to its mandate of price stability. Price stability is "a year-on-year increase in consumer prices of below 2%" (ECB, 2001c) as measured by the monetary union index of consumer prices for the euro area.[23] Because prices are affected in the short-run by many factors outside the control of the central bank and because monetary policy actions take time to affect inflation, the objective is seen as applying over the medium term.

The Federal Reserve System has three policy goals: "maximum employment, stable prices and moderate long-term interest rates" (Section 2A).[24] Unlike the Eurosystem's mandate, price stability is not given a higher priority than the other goals. Clearly, the policymakers of the Federal Reserve must assign at least an implicit ranking to these goals; in the long-run all three goals are compatible, but this is not necessarily true at every point in time. Perhaps as a result of this incompatibility, the Federal Reserve has never defined any of the goals.[25] Alan Greenspan has given what he termed "an operating definition of price stability": "Price stability obtains when economic agents no longer take account of the prospective change in the general price level in their economic decisionmaking" (Greenspan 1996).

Table 2

Tools of Monetary Policy

Federal Reserve	ECB
Open market operations	Open market operations
Discount window	Standing facilities
Reserve requirements	Reserve requirements

Monetary Policy Tools

The tools available to the two central banks are listed in Table 2.[26] In its policy meetings, the Federal Reserve sets a target for the federal funds rate, the interest rate banks charge each other to borrow reserves overnight. The Federal Reserve does not directly determine this interest rate but can control it through open market operations, which directly affect bank reserves. The Federal Reserve conducts

[23] The monetary union index of consumer prices is a weighted average of the harmonized indexes of consumer prices for the euro area countries. The weights are based on each country's share of euro area private domestic consumption expenditures. The harmonized indexes of consumer prices cover the same set of goods and services in each country and are calculated using the same methodology. The weights given to each item within the index, however, vary across countries based on the expenditure habits of the country's consumers.

[24] The 1913 Federal Reserve Act did not contain any macroeconomic goals. The 1946 Employment Act required the federal government to "promote maximum employment, production and purchasing power." Although the act did not mention the Federal Reserve, it was interpreted as applying to it. The 1977 Federal Reserve Reform Act specified the three goals listed in the text. See Judd and Rudebusch (1999) for a discussion of the goals of U.S. monetary policy.

[25] The 1978 Full Employment and Balanced Growth Act (commonly known as the Humphrey-Hawkins Act) specified goals of 3 percent for inflation and 4 percent for unemployment to be reached by 1983. The President was required to report in the Economic Report of the President the progress in meeting these goals. If the goals could not be met, the President was required to set revised goals. The Federal Reserve was required to report to Congress twice per year on its own objectives and how these related to the administration's goals. In practice, the Federal Reserve compared its forecasts for growth, unemployment, and inflation over the next two years with those of the administration.

[26] See Board of Governors (1994, Chap. 3) and ECB (2002) for a more detailed description of the monetary policy tools.

open market operations by buying or selling U.S. government securities (typically Treasury bills). Generally, open market operations are conducted as repurchase agreements. For example, the Federal Reserve sells securities with an agreement to repurchase them at a later date, usually no more than seven days later. The open market desk at the Federal Reserve Bank of New York is active daily in the market. As Figure 5 shows, through open market operations the Federal Reserve manages to keep the federal funds rate close to its target rate.[27]

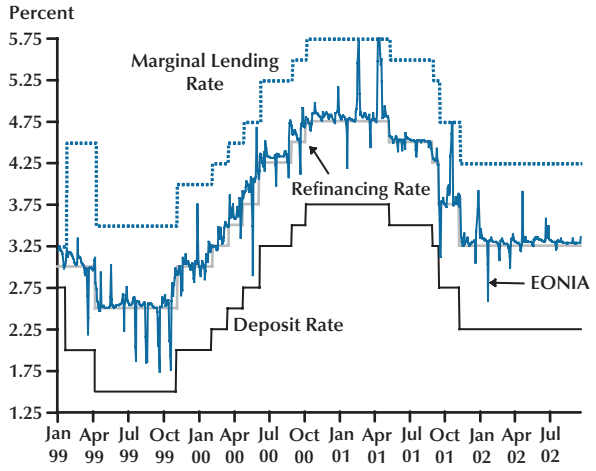
Open market operations conducted by the ECB are similar in some respects to those of the Federal Reserve. The ECB's most common open market operations, that is, main refinancing operations, are repurchase agreements that have a maturity of two weeks. There are, however, a few key differences between the use of open market operations by the Federal Reserve and the ECB. The ECB conducts main refinancing operations only once per week in contrast to the Fed's daily operations. Secondly, the Federal Reserve deals exclusively in U.S. government securities, whereas the ECB has a broader range of assets (even beyond that of securities issued by member country governments) that it accepts. Another difference is that, in the euro area, open market operations are decentralized; each national central bank executes operations with the financial institutions in its area, although these operations are coordinated by the ECB.

The main difference in the tools used by the two central banks is in the system of overnight loans made to financial institutions. These are referred to as discount window loans by the Federal Reserve and the marginal lending facility by the ECB.[28] In the United States, the board of directors of each Fed Bank sets the discount rate (the interest rate it charges on overnight loans to financial institutions) subject to approval of the Board of Governors.[29]

Figure 6

ECB Key Interest Rates and the Euro Overnight Index Average Rate (EOINA)

January 1, 1999, to September 20, 2002



The discount rate is set below the federal funds rate target, yet very little borrowing occurs.[30] This is because the Federal Reserve discourages borrowing at the discount window.[31]

The marginal lending facility operated by the ECB also provides overnight loans to financial institutions. The marginal lending rate is the rate at which financial institutions may borrow from the national central banks. It is set by the Governing Council and is always above the main refinancing rate.[32] In contrast to the constraints of the discount window, banks are allowed to freely borrow from this facility.[33]

The ECB operates another standing facility in addition to the marginal lending facility. The deposit facility allows banks to deposit funds overnight at the national central banks and earn interest on these deposits. These deposits are beyond those required to meet the minimum reserve requirement, discussed here later. The Federal Reserve also allows

[27] Two major exceptions have occurred in the last few years. The first was at the end of December 1999, when, as a Y2K precaution, the Federal Reserve allowed the federal funds rate to fall to ensure adequate liquidity for banks. The second was in the aftermath of September 11, 2001, when again the Federal Reserve allowed the federal funds rate to fall sharply to provide liquidity to banks.

[28] The discount window discussed in the text refers to the provision of adjustment credit, that is, credit extended to meet short-term liquidity needs of financial institutions. The regional banks also make discount window loans for seasonal and extended credit, at rates above the discount rate for adjustment credit. Extended credit is used in conjunction with the Federal Reserve's lender-of-last-resort function.

[29] Originally discount rates varied across Districts. But with the emergence of a national credit market, the Federal Reserve maintains a uniform discount rate.

[30] In recent years the policy has been to set the discount rate 50 basis points below the federal funds rate target.

[31] An exception occurred on September 11, 2001, when the Federal Reserve encouraged use of the discount window following disruptions in the federal funds market.

[32] The marginal lending rate most often has been set at 100 basis points above the main refinancing rate.

[33] Banks must have adequate collateral to borrow, as is also required for discount window loans.

banks to deposit excess reserves at the District Banks but does not pay interest on these reserves. The ECB deposit rate is set below the marginal refinancing rate, and typically the two standing facility rates form a symmetric band around the main refinancing rate, as shown in Figure 6.

More importantly, because banks are allowed to freely deposit and borrow through the standing facilities, the deposit rate and the marginal lending rate form a band around the euro overnight index average rate (EOINA), the overnight interbank rate. No bank will borrow money from another bank if it can borrow at a lower interest rate from the ECB, so the marginal lending rate sets the upper bound for EOINA. No bank will lend money at a lower interest rate than it can get by depositing money at the ECB, so the deposit rate sets the lower bound for EOINA, as shown in Figure 6.

The Federal Reserve has proposed changing the discount window by setting the discount rate 100 basis points above the federal funds rate target and not restricting borrowing.[34] This would discourage borrowing through a pricing mechanism rather than through the current administrative process. At the same time, the discount window would provide a source of funds when the money market tightens, raising the federal funds rate above its target. The discount rate would also act as a ceiling on the federal funds rate. The proposed changes would make the discount window function similar to the ECB's marginal lending rate.

The Federal Reserve has expressed its support for paying interest on overnight deposits.[35] Although several bills have been introduced in Congress in recent years to permit this, none have been passed.

Both central banks have established minimum reserve requirements for financial institutions. These are not now used as an active policy tool, as adjustments are infrequent. The Maastricht Treaty gave the Governing Council the right but not the obligation to set reserve requirements. The Federal Reserve Act, as amended by the 1980 Depository Institutions Deregulation and Monetary Control Act, requires the Federal Reserve to impose minimum reserve requirements on all depository institutions. The 1980 amendments also established the ranges for these requirements. The Federal Reserve may, however, temporarily suspend the reserve requirements (Section 11C).

[34] See Madigan and Nelson (2002).

[35] See, for example, Meyer (2001).

Making Monetary Policy Decisions

Monetary policy decisions for the United States and the euro area are made by the FOMC of the Federal Reserve and the Governing Council of the ECB, respectively. The FOMC consists of the seven members of the Board of Governors, the president of the Federal Reserve Bank of New York, and four other District Bank presidents who serve on a rotating basis.[36] Each District is grouped with one or two others as follows: Boston, Philadelphia, and Richmond; Cleveland and Chicago; Atlanta, Dallas, and St. Louis; and, Minneapolis, Kansas City, and San Francisco. The presidents of all 12 District Banks attend and participate in the policy deliberations of the FOMC, but only the members of the Board and the five presidents may vote on policy actions. The membership of the Governing Council of the ECB is much simpler, consisting of the six members of the Executive Board and all 12 euro area governors.

By law the Governing Council is required to meet at least ten times per year while the FOMC is required to meet only four times per year. Since its inception the Governing Council has generally met twice per month. This is far more than the FOMC, which since 1981 has scheduled eight meetings per year. Perhaps as a result, the FOMC has more often added meetings (generally through teleconferencing) to react to economic factors that have arisen during the intermeeting period. For example, the FOMC held three such meetings during 2001 (although these were the first since October 15, 1999). The only time the Governing Council has added a meeting was on September 17, 2001, to join the Federal Reserve in cutting interest rates as U.S. stock markets reopened following the September 11, 2001, terrorist attacks.

If eight meetings per year may sometimes be too few, 24 meetings per year may be too many. In November 2001, the Governing Council decided to generally limit its monetary policy discussions to

[36] When the FOMC was created by a 1933 amendment to the Federal Reserve Act, it consisted of "as many members as there are Federal reserve districts" (Section 12A). The board of directors of each Reserve Bank selected the representative from that District. Members of the Board of Governors were permitted to attend the meetings. In 1935 membership was changed to include "the members of the Board of Governors of the Federal Reserve System and five representatives of the Federal Reserve banks" (Section 12A). In 1942, New York was given a permanent position on the FOMC and the current groupings for the other Districts were established. In addition, the representative chosen by the board of directors of each District Bank had to be either the president or vice president of the Bank (BOG, 2000).

Table 3

Typical Attendees at a Meeting of the FOMC and the Governing Council

FOMC	Governing Council
12 members of FOMC	18 members of the Governing Council
7 other District Bank presidents	Translators
12 District research directors	Minute taker
Secretary of the FOMC	European Commissioner for Monetary Affairs, possibly
Deputy Secretary of the FOMC	Chair of the euro area finance ministers, possibly
2 assistant secretaries	
Manager of System Open Market Account	
Director of Research and Statistics, Board of Governors	
Director of the Division of International Finance, Board of Governors	
Director of Monetary Affairs, Board of Governors	
General Counsel	
Deputy General Counsel	
Other Board staff	

SOURCE: Minutes of the FOMC and Haring and Barber (2002).

the first meeting of each month. As explained by Duisenberg (2001):

> We have the impression that the bi-monthly meetings of the Governing Council also lead, every two weeks, to speculation in the markets and higher volatility in exchange rates and market interest rates than would be the case if we had a calmer rhythm of meetings.

The second monthly meeting is still held but now focuses on issues related to the other tasks of the ECB.

Preparing for Policy Meetings. Generally on the Thursday preceding a Tuesday FOMC meeting, members of the FOMC and the other District Bank presidents receive the Greenbook, a report on the state of the economy prepared by the Board of Governors staff and named for the color of its cover. The Greenbook contains the Board staff's analysis of current economic conditions as well as a forecast of the economy.[37] A few days later the Bluebook arrives. This report, also prepared by the Board staff and also named after the color of its cover, summarizes conditions in financial markets and lists the policy options. Two or three options are given, one of which is always to make no change in policy.[38]

About two days prior to the Thursday monetary policy meeting, members of the Governing Council receive a copy of the Orangebook (again, named for the color of its cover), prepared by the ECB's chief economist (currently Ottmar Issing), who is also a member of the Executive Board.[39] The Orangebook, like the Greenbook, provides an analysis of economic and monetary conditions. In contrast to the Bluebook, it provides not a range of policy options, but a policy recommendation.

The Policy Meeting.[40] The meetings of the Governing Council are more informal than those of the FOMC, with fewer attendees and fewer formal presentations. Table 3 lists the attendees at a typical meeting of the two policymaking boards. With the

[37] District Bank presidents are also briefed by their staff economists prior to meetings of the FOMC. Only limited numbers of the District staff are allowed to see the reports prepared by the staff at the Board of Governors.

[38] A detailed discussion of the FOMC meeting is given by Meyer (1998). Poole (1999) and Nash (2002) also provide insights into the workings of the FOMC.

[39] Information on the meetings of the Governing Council is from Haring and Barber (2002).

[40] The proceedings of a monetary policy meeting, particularly with respect to the policy discussion, often reflect the style of the head of the central bank.

exception of translators, there are normally no more than 21 attendees at the meetings of the Governing Council.[41] The meetings of the FOMC typically have between 50 and 60 attendees.

Monetary policy meetings of the Governing Council open with a presentation by the ECB's chief economist on the economic outlook report from the Orangebook. The other members of the Governing Council then present their views on policy. The ECB president summarizes the discussion and attempts to form a consensus on policy. No formal vote is taken at the meeting.

Meetings of the FOMC begin with a presentation by the Manager of the System Open Market Account at the Federal Reserve Bank of New York, who discusses open market operations undertaken during the intermeeting period as well as developments in domestic financial markets and foreign exchange markets.[42] Next, the director of Research and Statistics and the director of the Division of International Finance at the Board of Governors discuss the Board staff's forecast and international developments, respectively. Following these presentations, the Reserve Bank presidents and the members of the Board of Governors provide their own assessment of economic conditions and the outlook. The next part of the meeting focuses on a discussion of policy. The director of Monetary Affairs at the Board outlines the policy options given in the Bluebook. The Chairman then presents his policy preference. This is followed by an open discussion by members of the FOMC and the other District Bank presidents. At the close of this discussion the Chairman summarizes the discussion. He then reads a policy directive that reflects the view of the committee. The members of the FOMC vote on the policy directive.

INDEPENDENCE, ACCOUNTABILITY, AND TRANSPARENCY

In establishing the European System of Central Banks, policymakers endowed it with a high degree of independence from the governments of the member states and the European Union. The Governing Council, for example, was given explicit control over the tools of monetary policy and is prohibited from taking advice from the governments of the euro area. Even the nonrenewable term of office of members of the Executive Board was designed to protect them from political interference.[43] The Maastricht Treaty not only guaranteed the independence of the ECB, but also required that the national central banks be independent as a prerequisite for joining the Eurosystem.

This emphasis on independence was supported by various studies in the late 1980s and early 1990s that showed a negative correlation between the degree of independence of the central bank and the country's inflation rate.[44] Moreover, studies showed that a country did not have to sacrifice growth to achieve a lower rate of inflation. These studies helped fuel changes in the legal status of many central banks, reducing the amount of direct government control and increasing the emphasis on price stability. When the Federal Reserve Act was passed in 1913, independence of monetary policy was less of a concern: The Secretary of the Treasury as well as the Comptroller of the Currency were members of the Federal Reserve Board, and the former was the Chairman of the Board. Over time, however, the independence of the Federal Reserve has increased. Congress eliminated the two government positions on the Board effective in 1936.[45] The length of the term of office for Board members was increased from the original 10 years to 12 years in 1933 and then to the current 14 years in 1935. A key step in increasing the independence of the Federal Reserve was the 1951 Federal Reserve–Treasury Accord that released the Federal Reserve from a requirement, begun during World War II, to maintain interest rate ceilings on Treasury securities. This accord is seen as establishing the independence of monetary policy.

Independence, however, is not without its drawbacks. The decisions made by central bankers can have a profound effect on the economy and hence the public. Central bank independence removes these decisions from the hands of elected officials and restricts the ability of the government to remove

[41] According to Haring and Barber (2002), although translators are available, English is the common language of the Governing Council meetings.

[42] Information in this section comes from Meyer (1998).

[43] The appointment process, however, has not been without political meddling. When the selections for the initial Executive Board were being made, there was a general agreement among the member governments to appoint Duisenberg as president of the ECB. France, however, insisted that its own candidate, Jean Claude Trichet, be appointed president. France agreed to support Duisenberg only after he agreed to resign part way through his term. On February 7, 2002, Duisenberg announced that he would resign on July 9, 2003, after serving slightly more than five years of his eight-year term.

[44] See Pollard (1993) for a review of this literature.

[45] The 1935 amendment to the Federal Reserve Act that made this change also changed the name of the Federal Reserve Board to the Board of Governors of the Federal Reserve System.

central bank officials. Thus, in democratic societies accountability and transparency are seen as necessary to counterbalance central bank independence. Accountability holds the central bank responsible for its actions. Transparency, the ease with which policy actions can be observed and understood, is necessary for accountability. As explained by Roger Ferguson (2001), the vice chairman of the Board of Governors, transparency "gives the public the tools to hold the independent central bank accountable."

Accountability

For what should the central bank be accountable and to whom should it be accountable? The central bank should be held accountable for its legislative mandate—specifically, the goals set by the government.[46] Recall that the goal of the ECB is price stability—specifically, as defined by the Governing Council, an inflation rate of less than 2 percent over the medium term. The goals of the Federal Reserve are maximum employment, stable prices, and moderate interest rates. Accountability is easier when the central bank has a single goal, or at least a ranking of goals; for, as explained by Meyer (2000), multiple goals "always carry trade-offs, at least in the short-run, which are subject to the discretion of the central bank." The precision of numerical goals also aids in accountability.[47]

Ultimately a central bank should be accountable to the public; but, since the public has no direct control over the central bank, it is the obligation of the elected representatives of the people to hold the central bank accountable for its mandate. In the United States, it is natural that the Federal Reserve be accountable to Congress. Not only are the members of Congress the direct representatives of the American people, but Congress also has the ability to change the mandate of the Federal Reserve through amending the Federal Reserve Act. Moreover, it was Congress that delegated its constitutional authority to "coin money" and "regulate the value thereof" to the Federal Reserve.[48]

Indeed, in 1977 Congress amended the Federal Reserve Act to list the goals of the Federal Reserve and to require the Board of Governors to consult with Congress twice per year. This occurs through the Chairman's testimony before the Senate Banking, Housing, and Urban Affairs Committee and the House Banking and Financial Services Committee. The following year Congress further amended the Federal Reserve Act to require the Board of Governors to submit a written report to Congress prior to the Chairman's appearance before the congressional committees. This report had to include three things: (i) an analysis of recent economic conditions, (ii) the FOMC's forecast of economic conditions and monetary and credit aggregates, and (iii) the relationship between this forecast and the administration's forecast. The Federal Reports Elimination and Sunset Act of 1995 terminated the legal requirement for these semiannual reports and testimony at the end of 1999. Nevertheless, the FOMC decided to continue the reports and testimony as it believed they "enhanced its accountability to the public and the Congress" (FOMC, 1999).

In December 2000 Congress amended the Federal Reserve Act, reinstating the reporting requirement. Section 2B now specifies that "the Chairman of the Board shall appear before the Congress at semi-annual hearings" and that the Board shall submit a written report. The report is to contain

> A discussion of the conduct of monetary policy and economic developments and prospects for the future, taking into account past and prospective developments in employment, unemployment, production, investment, real income, productivity, exchange rates, international trade and payments, and prices. (Section 2B (b))

Within the euro area, it is more difficult to answer the "accountable to whom" question. The European Parliament is a good candidate since it represents the European public. As stated by Padoa-Schioppa (2000), a member of the Executive Board,

> In the political order of the European Union, the only institution that directly derives its role and legitimacy from the citizens is the European Parliament…The European Parliament is the institution of Europe's democratically elected representatives, which represents the interests of the peoples of Europe.

[46] This implies that a central bank has instrument independence, not goal independence, as distinguished by Debelle and Fischer (1994) and discussed in Meyer (2000).

[47] Numerical goals, however, are not always easy to define. For example, Judd and Rudebusch (1999) and Meyer (2000) point out that defining full employment is difficult since there is no consensus on an unemployment rate that corresponds to full employment. In addition, full employment is not a constant but varies as a result of demographics and government policies.

[48] See Article 1, Section 8, Clause 5 of the Constitution of the United States.

Yet, unlike the relationship between the U.S. Congress and the Federal Reserve, the European Parliament has little authority over the ECB. The European Parliament may request that members of the Executive Board appear before its committees, but has no such power over the other members of the Governing Council (the governors of the national central banks).[49] Parliament gives advice on the appointments to the Executive Board but has no veto power over these, unlike the role of the U.S. Senate.[50] Furthermore, Parliament has no power to change the laws governing the ECB. Indeed, the only way to change the mandate of the ECB or most other regulations regarding its operation is through an amendment to the treaty. This requires the agreement of all 15 governments of the European Union and then ratification of the amendments by the 15 national parliaments. In some countries passage of a public referendum is also necessary. Furthermore, the ECB must be consulted before any changes can be made to its charter.

The Maastricht Treaty does require the ECB to report annually "on the monetary policy of both the previous and current year" (Article 113) to the European Parliament, ECOFIN, the European Commission, and the European Council. The president of the ECB must present the report to the European Parliament and to ECOFIN. This requirement to report to multiple bodies reflects the lack of a single institution that has control over the mandate of the central bank and represents the European public.

Transparency

Transparency in monetary policy includes three key aspects: (i) transparency in goals, (ii) transparency in policy decisions, and (iii) transparency in the outlook. The first requires not only that the goals of the central bank be clearly defined but that they be easily understood.[51] The Maastricht Treaty clearly identifies the goal of the ECB—price stability. The Governing Council further clarified this goal by giving a quantitative definition to price stability. Since deviations from price stability at a point in time are not necessarily indicators of a failure of policy, the ECB also sets a monetary aggregate target as a way to determine whether its policies are likely to be successful.

The goals of the Federal Reserve are stated in the Federal Reserve Act; but, as noted here previously, these goals are neither defined nor ranked. The FOMC was required to set monetary aggregate targets by the Federal Reserve Act; when this requirement expired at the end of 1999, however, it abandoned the practice.

Transparency also requires that policy decisions be communicated to the public in a clear way along with the reasoning behind the decisions. The ECB issues a press release and the president of the ECB holds a news conference (also attended by the vice president) following the monetary policy meetings of the Governing Council.[52] The press release announces any changes in the main refinancing, marginal lending, and deposit rates. At the press conference the President gives an overview of economic conditions and the outlook for the euro area to provide a framework for the policy decision. The ECB also publishes a monthly bulletin discussing any policy changes as well as economic conditions in the euro area.[53]

The Federal Reserve also issues a press release following each FOMC meeting, but does not hold a news conference. Perhaps, as a result, the press release is more detailed than that of the Governing Council.[54] The press release begins with an announcement of any change in the federal funds rate target. It then provides a brief overview of economic conditions and the reason for any policy change. Since March 2002, the release has included the vote of the FOMC. If any member dissents from the approved policy action, the member is named and the preferred policy action is noted. The release also states any changes in the discount rates along with a list of Districts requesting the change.

A day or so following its next scheduled meeting, the FOMC releases the minutes of the previous

[49] Currently, once per quarter the ECB President appears before the European Parliament Committee of Economic and Monetary Affairs to explain the recent policy decisions of the Governing Council.

[50] The U.S. Senate has no input into the appointments of the presidents of the District Banks nor does the European Parliament have any input into the appointments of the heads of the national central banks. On the FOMC, members of the Board of Governors outnumber the presidents; on the Governing Council, the governors of the national central banks outnumber the members of the Executive Board.

[51] See Judd and Rudebusch (1999).

[52] Prior to 2001, when the Governing Council met twice per month to formulate monetary policy, the press conference was held only after one of the monthly meetings.

[53] The press releases, transcripts of the press conference, and bulletin are available at < www.ecb.int > .

[54] See the boxed insert "Press Releases Following Meetings of the FOMC and the Governing Council" for a comparison of recent press releases by the two central banks.

PRESS RELEASES FOLLOWING POLICY MEETINGS OF THE FOMC AND GOVERNING COUNCIL

Federal Reserve Press Release

Release Date: September 24, 2002
For immediate release

The Federal Open Market Committee decided today to keep its target for the federal funds rate unchanged at 1 3/4 percent.

The information that has become available since the last meeting of the Committee suggests that aggregate demand is growing at a moderate pace.

Over time, the current accommodative stance of monetary policy, coupled with still robust underlying growth in productivity, should be sufficient to foster an improving business climate. However, considerable uncertainty persists about the extent and timing of the expected pickup in production and employment owing in part to the emergence of heightened geopolitical risks.

Consequently, the Committee believes that, for the foreseeable future, against the background of its long-run goals of price stability and sustainable economic growth and of the information currently available, the risks are weighted mainly toward conditions that may generate economic weakness.

Voting for the FOMC monetary policy action were: Alan Greenspan, Chairman; William J. McDonough, Vice Chairman; Ben S. Bernanke; Susan S. Bies; Roger W. Ferguson, Jr.; Jerry L. Jordan; Donald L. Kohn; Mark W. Olson; Anthony M. Santomero, and Gary H. Stern.

Voting against the action were: Edward M. Gramlich and Robert D. McTeer, Jr.

Governor Gramlich and President McTeer preferred a reduction in the target for the federal funds rate.

ECB Press Release

Monetary policy decisions
12 September 2002

At today's meeting the Governing Council of the ECB decided that the minimum bid rate on the main refinancing operations and the interest rates on the marginal lending facility and the deposit facility will remain unchanged at 3.25%, 4.25% and 2.25% respectively.

The President of the ECB will comment on the considerations underlying these decisions at a press conference starting at 2.30 p.m. today.

meeting.[55] The minutes provide a more detailed summary of the economic conditions, outlook, and reasons underlying the policy stance adopted at the meeting. The minutes do not ascribe policy views to any particular member of the FOMC except in the case of a dissenting vote.

The ECB does not release minutes of its meetings nor are there formal votes. Every year the European Parliament has passed a resolution calling on the ECB to publish the minutes of Governing Council meetings. Members of the Governing Council argue that releasing minutes would limit the exchange of ideas that occur at the meeting and furthermore that the press conference already provides a summary of the meeting.[56] The European Parliament has

[55] The press release and minutes are available at <www.federalreserve.gov/fomc>.

[56] See, for example, Hämäläinen (2000).

also called on the Governing Council to vote and to include in the minutes a summary of the vote without listing names. Duisenberg (2002) has argued that listing the dissenting views even anonymously "could lead to undue pressure on national central bank governors to deviate from a euro area perspective."

Transparency in policy also extends to the outlook for the economy. Understanding the central bank's outlook for the economy provides a guide to future policy moves. The Federal Reserve releases two types of information regarding its outlook for the economy. In its semiannual report to Congress it publishes the range and central tendency of the individual forecasts of the members of the Board of Governors and the presidents of the District Banks with respect to output, inflation, and unemployment for the current and following year. Since February 2000 the press release issued by the FOMC includes a balance of risks statement that indicates

> how the Committee assesses the risks of heightened inflation pressures or economic weakness in the foreseeable future. This time frame in the new language is intended to cover an interval extending beyond the next FOMC meeting. (Federal Reserve Press Release, January 19, 2000)

The balance of risks statement (particularly shifts in the balance) is viewed as an indicator of future policy by the FOMC.[57]

The ECB initially resisted publishing forecasts, but began including them in its *Monthly Bulletin* in December 2000. Neither the Federal Reserve nor the ECB publishes detailed forecasts like the staff forecasts of the Board of Governors.

CONCLUSION

Central banking is often described as an art, not a science. As a result there is no blueprint for the structure and operations of a central bank. Although the structures of the Federal Reserve System and the Eurosystem are similar, there are many differences in the way they operate. The Eurosystem is more decentralized than the Federal Reserve, with more tasks left to the national central banks. Even the conduct of monetary policy is more decentralized. Open market operations in the United States are conducted only by the Federal Reserve Bank of New York, following discussion between the staff at the Open Market Desk and at the Board of Governors. In the Eurosystem each national central bank carries out open market operations, although these are coordinated with the ECB.

The Board of Governors has more control over the appointments of the presidents of the District Banks than the Executive Board has over appointments of the heads of the national central banks. In the United States, the District Bank presidents must be approved by the Board of Governors. In Europe the national governments alone determine the heads of the national central banks.

Of course, the structure of central banks is not static. Over its 90-year history, the legislation governing the Federal Reserve has been amended numerous times. Although the laws governing the Eurosystem are more cumbersome to amend, if it follows the path of the Federal Reserve then centralization will increase over time.

Transparency has also increased. Not so many years ago monetary policy was shrouded in secrecy. Central banks seemed to make every effort to prevent monetary policy from being comprehensible to the general public. Initially, measures aimed at greater transparency were often imposed upon central banks. Perhaps surprising, central banks themselves have become champions of transparency, for transparency not only has proved to be helpful in making central banks more accountable but also has had the added benefits of increasing the credibility and predictability of monetary policy. As put by William Poole (2001), president of the Federal Reserve Bank of St. Louis, "we expect better public policy outcomes from a transparent process."

Disagreements remain over how to best make policy transparent while at the same time preserving the independence of the central banks. The Federal Reserve, for example, has recently begun publishing the roll call on the policy directive immediately following an FOMC meeting. If there is a dissent the action preferred by the dissenter(s) is also given. The ECB not only does not publish the vote, but also does not have a formal vote on policy at the Governing Council meetings. It is concerned that, given the multinational character of the Eurosystem, any knowledge of voting would lead to political pressure on the representatives of the national central banks. Over time, as the credibility and independence of the Eurosystem becomes established, it is likely that such concerns will fade.

[57] See Rasche and Thornton (2002).

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Was Y2K Behind the Business Investment Boom and Bust?

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According to the Business Cycle Dating Committee of the National Bureau of Economic Research, the nation's record-long business expansion ended in March 2001, exactly 10 years after it started. Much of the downturn in the growth of U.S. economic activity during 2001 can be traced to a sharp decline in business purchases of information processing equipment and software, otherwise known as high-tech capital goods. This investment bust came on the heels of a boom in spending on those same types of capital goods over the latter part of the 1990s. Although business fixed investment spending tends to be pro-cyclical, this time the boom and bust was unusually large. One explanation for the boom and bust that has not been explored in much detail was the surge in business purchases of hardware and software in preparation for the century date change (hereafter, Y2K). Was the boom due to efforts by firms to upgrade their computer hardware and software? Likewise, was the bust caused by the cessation of Y2K-related capital spending?

RECENT TRENDS IN BUSINESS FIXED INVESTMENT SPENDING

In the national income and product accounts (NIPA), nonresidential investment (or business fixed investment [BFI]) comprises investment in structures and investment in equipment and software (E&S). Over the past 25 years, fixed investment in structures as a share of total BFI has dropped from about 33 percent to 27 percent, so that, accordingly, business investment in E&S as a share of BFI has grown from about 67 percent to about 73 percent. Figure 1 shows that there has been a marked shift in the composition of E&S investment since 1977.[1] Business expenditures on E&S investment are classified under four categories: (i) information processing equipment and software (IPES), (ii) transportation equipment, (iii) industrial equipment, and (iv) other. In 1977, each amounted to roughly 17 percent of total BFI. By mid-2000, IPES investment as a share of BFI had grown to a little less than 36 percent, while the remaining components had smaller shares than they did in 1977.

Figure 2 shows that increased spending on software accounted for the bulk of the increase in IPES investment spending. From 1977 to late 2001, the share of software investment rose from a little more than 15 percent to nearly 47 percent. Over this period, the share of fixed investment in computers rose markedly less, from about 15 percent to about 18 percent.

In terms of its contribution to real GDP growth, the investment boom in the high-tech sector was largely a phenomenon of the late 1990s. Real IPES investment grew at a little more than 12 percent per year from 1990 to 1995. This rate of growth accelerated to a little more than 19 percent per year from 1995 to 2000, so that by the fourth quarter of 2000 it was at an all-time high as a share of BFI (Figure 1). Not surprisingly, the contribution to real GDP growth from IPES, as seen in Table 1, increased measurably during the latter half of the 1990s. From 1990 to 1995, growth of BFI contributed 0.4 percentage points of the 2.3 percent growth per year of real GDP. From 1996 to 2000, though, the contribution of real BFI jumped to 1.2 percent per year, a bit less than a third of the 4.0 percent per year growth of real GDP. During this period, the largest contribution to real BFI growth stemmed from E&S investment (averaging 1.0 percentage points). The contribution from business structures, industrial, and transportation equipment was relatively small.

Beginning in the second half of 2000, businesses started to scale back their purchases of most types of capital goods—not just high-tech equipment and software (IPES). Indeed, over the four quarters

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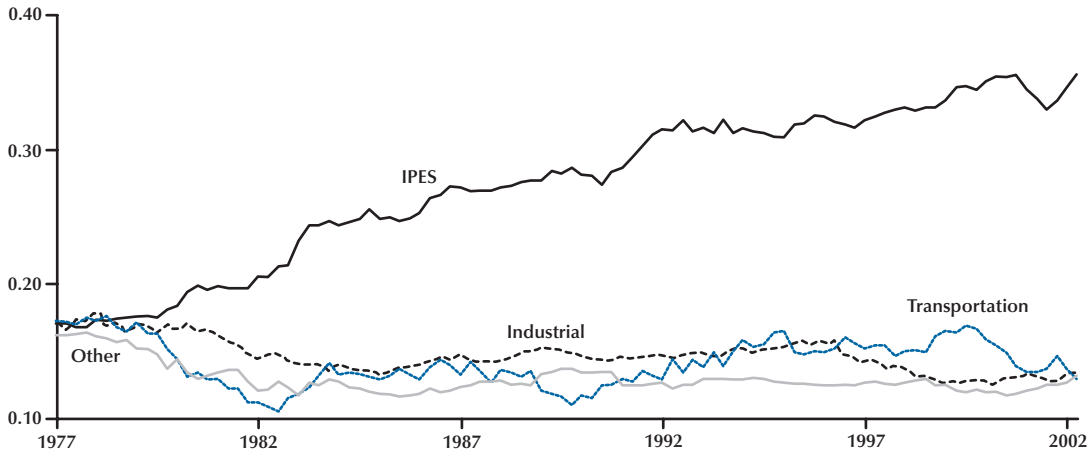
[1] Because chain weights do not have the additive and multiplicative properties of fixed weights, it is not correct to express shares in real terms. Thus, Figure 1 expresses shares in current (nominal) dollars. See Whelan (2000).

Figure 1

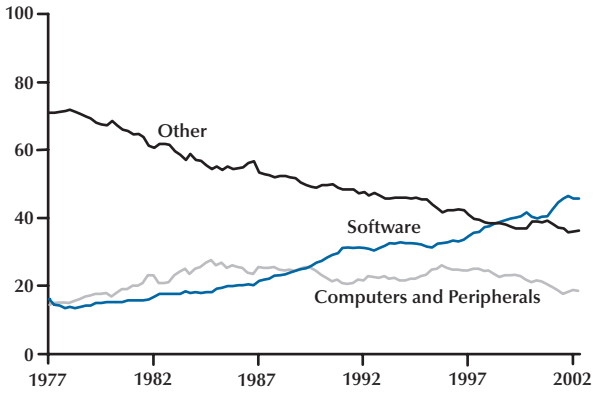
E&S Investment as a Share of Nonresidential Fixed Investment



NOTE: Shares expressed in current (nominal) dollars.

Figure 2

Composition of IPES Fixed Investment



NOTE: Shares expressed in current (nominal) dollars.

of 2001, real fixed investment in business structures fell 10.6 percent, about the same as the decline in IPES investment (10.5 percent); real investment in E&S fell less, roughly 9 percent. As seen in Table 1, of the 3.7-percentage-point decline in real GDP growth from 1996-2000 to 2001, nearly half (1.6 percentage points) stemmed from the swing in E&S investment, with IPES investment comprising the bulk of that (1 percentage point).

CONVENTIONAL EXPLANATIONS OF THE INVESTMENT BOOM AND BUST

Firms will invest (i.e., purchase capital equipment) in order to increase their future profit opportunities. Hence, a firm's decision to invest will depend on its projection of those future profit opportunities (expected future returns) and the cost of making the investment (cost of capital). In terms of explaining the recent investment boom and bust, it might be useful to consider two competing explanations. One explanation is that the investment boom may have simply been a cyclical phenomenon. That is, expected returns to investment rose as economic growth accelerated. Moreover, rapidly advancing technology and declining prices of information technology goods lowered the cost of capital for high-tech capital goods relative to other capital goods, boosting investment in information processing and communications equipment.

Another explanation suggests that the investment bust came about as aggregate demand growth weakened in 2000 and 2001 in response to the sharp declines in equity prices, especially those of technology stocks. Second, expected returns during the latter part of the 1990s may have risen because of problems associated with Y2K. That is, the opportunity cost of not fixing potential computer and software problems was high. Failure to fix the problems may have resulted in disruptions to business activity and, hence, lower profits. Once these Y2K

Table 1

Real BFI Contributions to Real GDP Growth (Percentage Points)

	1970-79	1980-89	1990-95	1996-2000	2001
Real GDP Growth	3.3	3.0	2.3	4.0	0.3
Contributions from:					
Nonresidential fixed investment	0.6	0.4	0.4	1.2	–0.7
Structures	0.1	0.1	–0.1	0.2	–0.1
Equipment and software	0.5	0.3	0.5	1.0	–0.6
Information processing	0.3	0.4	0.3	0.7	–0.3
Computers and peripherals	0.1	0.2	0.2	0.3	0.0
Software	0.0	0.1	0.1	0.2	0.0
Other	0.1	0.1	0.1	0.2	–0.2
Industrial equipment	0.1	0.0	0.0	0.1	–0.1
Transportation equipment	0.1	0.0	0.1	0.1	–0.2
Other	0.1	0.0	0.0	0.1	0.0

NOTE: Percentages are averages of years indicated (subject to rounding errors).

problems were addressed, the expected returns were zero and these types of investment ceased.

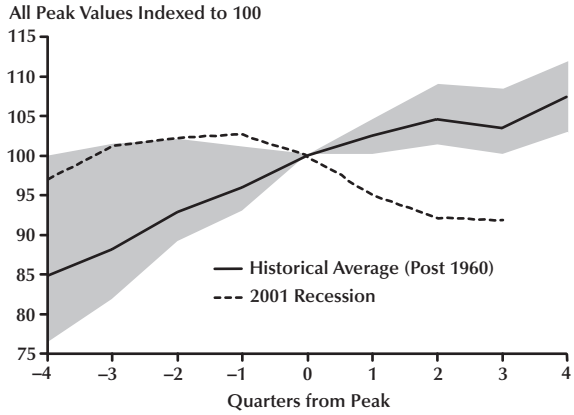
Was There Excess Investment During the 1990s?

The substantial decline in investment spending beginning in late 2000—both high-tech and non-high-tech—led some to conclude that firms over-invested in capital goods during the latter part of the 1990s.[2] Excess investment is usually thought of as the amount of capital goods (in the aggregate) that exceeds the amount that businesses require to produce the existing demand for goods and services. In the context of the firm's investment decision noted above, it is useful to think of excess investment as the result of firms overestimating future profit opportunities (expected returns) in the present relative to the existing cost of capital. During the latter half of the 1990s and into early 2000, excess investment may have occurred because firms expected the rapid rate of aggregate growth to persist longer than it did.

Figure 3 provides some evidence that there may have been excess business investment in IPES. In Figure 3, the levels of real IPES investment are indexed to 100 for each of the post-World War II business cycle peaks (excluding the 1980 and 2001 peaks). The average of these indexed levels is plotted (solid line), as is the indexed level for the most recent period (2000-01)(dotted line). Relative to previous peaks (as defined by the National Bureau of Economic Research), IPES investment was exceptionally strong just before the 2001 recession,

Figure 3

Real IPES



NOTE: The shaded area represents the range of previous recessions.

[2] In some circles, this was termed a "capital overhang." See Council of Economic Advisers (2002) or French, Klier, and Oppedahl (2002).

Table 2

Was There Excess Investment During the 1991-2001 Expansion? (Percentage Deviations from Trend)

Expansion period	Business structures	IPES	Industrial equipment	Transportation equipment	Residential
1961:Q2 to 1969:Q4					
Average deviation	–0.44	–0.97	–0.87	0.17	–0.73
High	8.56	10.59	9.48	13.07	13.23
Low	–8.55	–9.98	–13.90	–15.08	–22.99
High – Low	17.11	20.58	23.39	28.15	36.22
1970:Q4 to 1973:Q4					
Average deviation	1.07	1.45	–3.29	–1.25	8.40
High	8.77	9.29	11.74	16.11	18.41
Low	–3.46	–5.41	–12.01	–32.48	–8.64
High – Low	12.23	14.70	23.74	48.59	27.05
1975:Q1 to 1980:Q1					
Average deviation	–3.48	–3.23	–1.66	–0.26	0.03
High	5.64	4.09	9.11	16.58	15.43
Low	–10.03	–13.34	–9.26	–23.53	–35.85
High – Low	15.66	17.43	18.37	40.12	51.28
1982:Q4 to 1990:Q3					
Average deviation	–0.40	0.86	–0.20	0.44	2.04
High	8.48	7.99	8.89	8.96	8.29
Low	–14.77	–15.28	–16.41	–19.93	–29.61
High – Low	23.25	23.26	25.30	28.89	37.91
1991:Q1 to 2001:Q1					
Average deviation	–1.01	–0.95	–1.04	–0.97	–1.33
High	5.65	4.77	4.86	10.06	8.13
Low	–6.45	–6.17	–9.27	–15.69	–20.73
High – Low	12.10	10.94	14.13	25.75	28.86

NOTE: Percentages are calculated as deviations from trend in chain-weighted dollars. The trend value is estimated from the Hodrick-Prescott algorithm. See footnote 5. Sample period for Hodrick-Prescott calculations is 1947:Q1 to 2001:Q1 for all categories except IPES, which begins in 1959:Q1.

before falling off considerably.[3] In fact, the figure suggests that the high-tech investment boom and bust of 2001-02 was the largest in the post-World War II period.

There are other ways to ascertain whether there was excess investment toward the end of the 1991-2001 expansion. One method is to compare the desired aggregate capital stock to the actual capital stock (the linkage between the two, of course, is investment spending). A difficulty with this approach is that the desired capital stock can only be estimated from an econometric model.[4] Another method of ascertaining whether excess investment occurred is to calculate the percentage deviation of the actual

[3] IPES data are available only back to 1959 at a quarterly frequency. Calculations exclude the short 1980 recession.

[4] Macroeconomic Advisers (2002) found that the actual stock of IPES capital exceeded the desired stock by a little more than 6 percent during the fourth quarter of 2000 (the largest deviation of the 1991-2001 expansion). This estimate was calculated prior to the 2002 annual revisions of the NIPA data.

level of real fixed investment from the trend level.[5] Table 2 shows these percentage deviations for real fixed investment in business structures, IPES, industrial equipment, transportation equipment, and residential investment for each U.S. business expansion since 1960.

One aspect of the typical business expansion that is seen from Table 2 is that real investment is highly volatile. This is illustrated by the difference between the high and low percentage deviations from trend (at a quarterly frequency). In the 1982-90 expansion, for example, real IPES investment relative to its trend ranged from –15.3 percent to +8.0 percent. Even larger percentage deviations from trend were seen in previous expansions and among other forms of fixed investment. Thus, if a large, positive percentage deviation from trend is viewed as a sign of excess investment, excessive investment during the 1991-2001 expansion was atypical in that it was comparatively mild. The largest positive deviation occurred in transportation equipment (10.1 percent). This was relatively small compared with the deviation in the 1961-69, 1970-73, and 1975-80 expansions, but it exceeded the deviation in the 1982-90 expansion. For the 1991-2001 expansion, positive deviations from trend of similar size were noted in business structures, industrial equipment, and residential fixed investment. Thus, it does not appear that excess IPES investment was particularly noteworthy. The largest positive percentage deviation from trend occurred in the second quarter of 2000, but it was small (4.77 percent) compared with previous expansions, such as the 1961-69 (10.59 percent) and 1982-90 (7.99 percent) expansions.

While the evidence from Table 2 suggests that the investment boom in the 1990s was not excessive, the data from Table 1 nonetheless show that the surge in BFI spending contributed appreciably to real GDP growth. One popular explanation for the recent investment boom is the acceleration in labor productivity growth beginning around 1995, which some have dubbed the "New Economy" story and which ties in with the rise in corporate equity prices in the latter half of the 1990s.[6]

The New Economy Story

Beginning around 1995, prices for computers and peripherals began to fall sharply. After falling an average of 12.8 percent per year from 1990 to 1994 (annual data), computer prices fell an average of 24.1 percent per year from 1995 to 1999. Bolstered by falling prices, expenditures (output) on high-tech capital goods rose sharply.[7] From 1995 to 2000 (annual data), production of high-tech equipment rose an average of roughly 40 percent per year, after growing an average of a little more than 21 percent per year from 1990 to 1995.[8] The increased amount of high-tech capital equipment available to workers (capital deepening) raised their labor productivity.[9]

A potential key impetus behind the investment boom during this period was the sharp rise in corporate equity prices. All else equal, rising equity prices lower the (equity) cost of capital, which, by lowering the hurdle rate that separates profitable from unprofitable investments, spurs firms to increase their level of fixed capital investment (and output). Figure 4 indicates that corporate equity prices during the late 1990s rose the most among those publicly traded firms generally thought of as both users and producers of information technology (IT) capital goods such as computers, semiconductors, and software. From October 8, 1998, to March 10, 2000, the technology-heavy Nasdaq composite index rose nearly 260 percent to just under 5050. Over the same period, the Wilshire 5000 index rose from about 8,621 to a little more than 13,952, an increase of about 62 percent; while noteworthy, this increase is a far cry from 260 percent. The larger increase in the Nasdaq composite index (decline in the cost of

[5] The trend was calculated using the Hodrick-Prescott filter, a statistical smoothing algorithm used to estimate the long-term trend component of a time series. The Hodrick-Prescott filter removes movements that are thought to arise merely from changes associated with the business cycle. The calculation here was done in EViews Version 4.0.

[6] See Greenspan (1998).

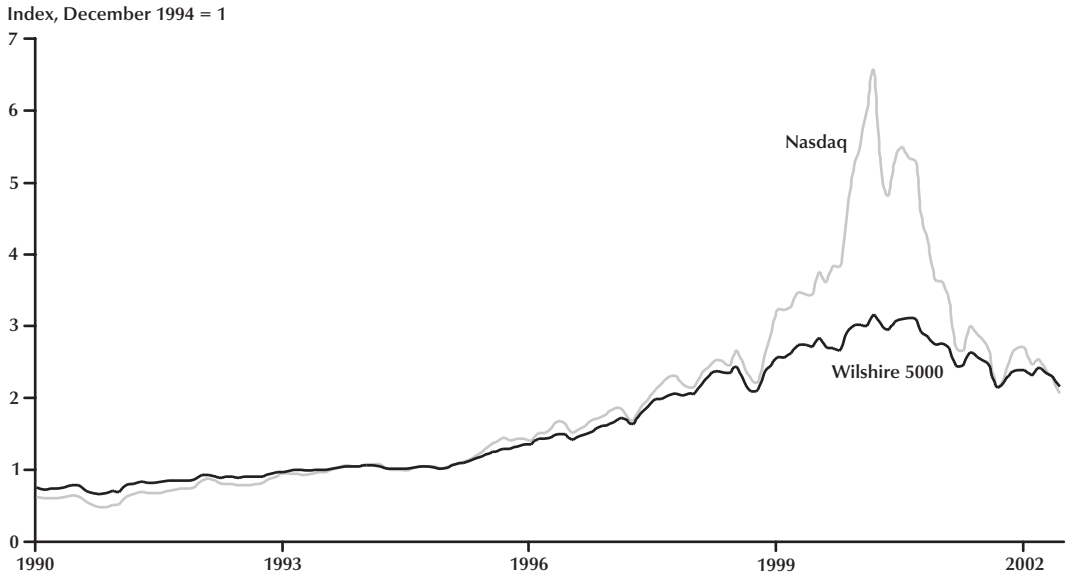
[7] Pakko (2002) tackles the thorny issue of whether improvement in the quality of high-tech capital goods—as reflected in the sharp declines in relative prices of computers and other information technology equipment—was overstated. If true, this would overstate the growth of real capital spending. He finds that generally not to be the case.

[8] High-tech is defined as non-energy output of computers, communications equipment, and semiconductors. See the Federal Reserve Board's G.17 statistical release (Industrial Production and Capacity Utilization).

[9] Surveying five prominent studies, Stiroh (2002) found that the contribution of IT-related investment—both the production and use of IT capital goods—explained a substantial portion of the roughly 1-percentage-point acceleration in the growth of labor productivity from 1973-95 (1.4 percent) to 1995-99 (2.4 percent). These studies use a production-function framework to estimate the contribution of the change in labor productivity growth stemming from (i) capital deepening, (ii) labor quality, and (iii) total factor productivity. Three of the five studies found that the dominant contribution arose from an acceleration in total factor productivity growth that was largely due to IT-related effects.

Figure 4

Nasdaq and Wilshire 5000 Equity Market Indices



capital) relative to the Wilshire 5000 index is consistent with the figures reported in Table 1, which show that the acceleration in BFI was the largest in the IPES segment.

Beginning in March 2000, markets began to reassess their estimates of future profitability in the IT sector. This is seen by the steep decline in the Nasdaq composite index in Figure 4. By September 10, 2001, the Nasdaq had fallen to just under 1,700, giving up most of the gains seen over the past three years. As the equity cost of capital in the IT sector began to rise sharply, demand for high-tech goods began to wane. Accordingly, manufacturers of high-tech capital goods began to scale back production: From October 2000 to September 2001, output of IT capital goods fell 16 percent. And since (nominal) investment in business E&S had risen to about 10 percent of GDP in 2000, the subsequent fall in the demand for these products led to a sharp deceleration in output growth (see Table 1).

As seen in Figure 5, the Nasdaq composite index peaked much earlier (March 2000) than did production of high-tech capital spending (December 2000), though the growth of high-tech output began to decelerate markedly in May. Although the timing suggests that the plunge in the Nasdaq may have been a significant factor behind the high-tech investment bust, it does not readily explain the decline in non-high-tech investment spending.[10] Although the Wilshire 5000 index also peaked in March 2000, real BFI in transportation equipment peaked much earlier, in the third quarter of 1999, while real fixed investment in structures peaked in the fourth quarter of 2000 and industrial equipment during the first quarter of 2001.

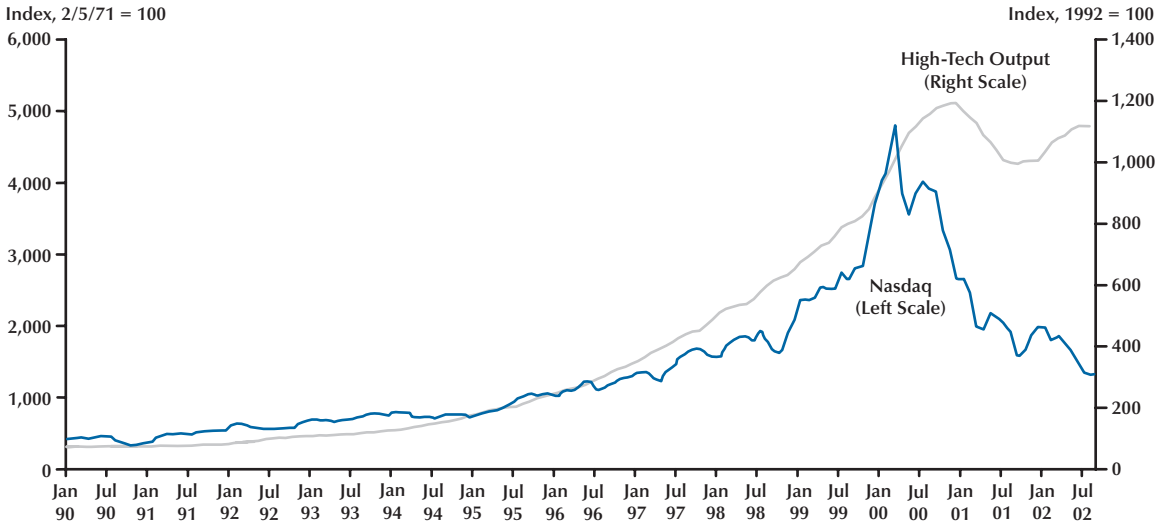
McCarthy (2001) attempted to ascertain whether falling equity prices could explain the investment boom and bust in E&S (a mix of high-tech and non-high-tech capital goods). To test this hypothesis, McCarthy used a series of one-step-ahead forecasts (from the first quarter of 1995 to the second quarter of 2001) derived from a standard neoclassical model of business investment, which was augmented with a measure of equity market valuation (Tobin's Q). He found that the model did a reasonably good job of predicting the growth of real E&S fixed investment spending from 1995 into early 2000.[11] Beginning in mid-2000, though, the model substantially underpredicted the falloff in capital spending. Using a counterfactual exercise that assumed equity values grew from 1995 onward at their 1980-94 pace, he

[10] Moreover, recall from the discussion of Table 2 that the largest percentage deviation of IPES investment from trend occurred in the second quarter of 2000.

[11] McCarthy's estimates were derived prior to the July 2002 annual NIPA revisions.

Figure 5

Nasdaq Composite Index and Output of Selected High-Tech Industries



found that the model predicted E&S investment would have still grown at a double-digit pace, but that the drop in equity prices exerted some drag on fixed investment growth. In particular, he found that real E&S investment growth would have been about 4 percentage points higher if the stock market had not fallen as it did.[12] Furthermore, McCarthy found a larger effect from the sharp drop in equipment prices over the latter half of the 1990s, which he attributes to weak demand. If so, then one potential source of weak demand may have been the end of the expenditures by businesses to fix the so-called Y2K computer bug.

CAN Y2K EXPLAIN THE INVESTMENT BOOM AND BUST?

One explanation of the high-tech investment boom and bust that has received relatively scant attention centers on the surge in spending by private businesses to ready themselves for Y2K.[13] The "Y2K problem," as it was called, was viewed by some government entities as "potentially extremely serious," given the computer's predominant role in large industrialized economies.[14] According to industry figures cited by the U.S. Department of Commerce in July 1998, almost 90 percent of all firms with fewer than 2,000 employees had not started Y2K "remediation projects" as of 1997. Moreover, nearly half of all personal computers shipped in 1997 were not Y2K compliant.[15] Some economists went so far as to predict a "severe" global recession, arising from widespread disruptions to, for example, the air transportation system, electrical grids, the financial infrastructure, and government services.[16] To prevent these disturbances from materializing, the private sector began to devote a considerable amount of resources to fixing the problem. One manifestation of this was the upsurge in payroll employment in computer and data processing services. As seen in Figure 6, year-over-year growth throughout much of 1999 was quite strong, reaching nearly 17 percent in August. This rapid growth, however, was not historically large, as evidenced by the much stronger growth seen during the late 1970s and early 1980s.

Public policymakers were also devoting con-

[12] McCarthy also ran a counterfactual exercise that assumed relative prices of E&S capital goods from 1995 onward fell at a constant rate equal to their 1980-94 average. In this counterfactual forecasting exercise, he found that the model does a better job of forecasting the investment bust in 2000-01.

[13] The 2002 *Economic Report of the President* states on p. 36 that some of the 2000-01 slowdown reflected the "lingering effects" of Y2K.

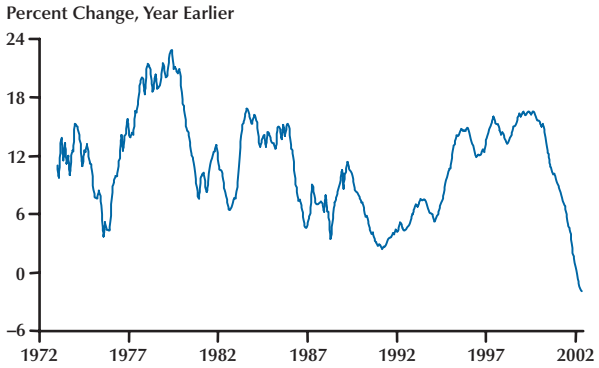
[14] Council of Economic Advisers (1999, p. 77).

[15] Bachula (1998).

[16] Edward Yardeni, now at Prudential Securities, was the chief alarmist on the Y2K issue. See Matthews (1998).

Figure 6

Employment Growth in Computer and Data Processing Services



SOURCE: U.S. Bureau of Labor Statistics.

siderable time and resources to minimizing the Y2K problem. The Federal Reserve System, anticipating a precautionary surge in the demand for cash by households, formulated a "temporary financing facility" designed to ensure that sufficient liquidity existed for the banking system around the time of the century date change. Part of this effort included a large increase in the supply of currency to depository institutions.[17]

Perhaps because of the preventative efforts undertaken by the public and private sector beforehand, most forecasters evidently were of the opinion that the Y2K problem would not be a significant macroeconomic event. Still, some precautionary spending was expected to occur. According to the panel of Blue Chip forecasters in July 1999, real GDP growth in the second half of 1999 was expected to be boosted by a buildup of business inventories by firms and an upswing in purchases of nondurable goods by households. This effect was expected to be relatively small, though: In the May 1999 Survey of Professional Forecasters, nearly 60 percent of forecasters expected the assorted Y2K effects to boost real GDP growth by 0.1 to 0.5 percentage points in 1999. In 2000, as these temporary effects reversed, about half of the forecasters expected an effect on real GDP growth of between 0.0 and –0.4 percentage points. The net effect was expected to be essentially zero, and, at first glance, the end-of-year Y2K disruptions to the aggregate economy turned out to be minimal.

The alarmists turned out to be wrong about a Y2K-inspired worldwide depression; nevertheless, the high-tech investment boom and bust shortly before and after the century date change suggests some causality. Table 3, which replicates the Hodrick-Prescott framework of Table 2, indicates that the investment bust—as seen by the largest negative percentage deviation from trend (low)—was especially large for IPES. During the 2001 recession, IPES investment at one point was 13.68 percent below trend, which was surpassed only by the severe 1981-82 recession. The average deviation of IPES investment during the 2001 recession (–7.22 percent), however, was much larger than in the previous recessions listed. Table 3 also shows (compared with previous recessions) a large negative deviation for transportation equipment (–10.5 percent), but not for industrial equipment (–2.95 percent) or residential fixed investment (–1.88 percent).

The evidence in Table 2 shows that the largest positive deviation in real IPES investment spending from trend during the 1991-2001 expansion was not unusually large (compared with previous expansions). This finding suggests that Y2K spending was probably not that significant during the investment boom. However, the evidence from Table 3 is at least consistent with the conjecture that a cessation of business spending on Y2K fixes may have exacerbated the sharp decline in IT investment spending. To see whether the end of Y2K was responsible for the high-tech investment bust, it will be useful to look at the estimated amount of Y2K outlays by businesses that flowed into the NIPA.

Accounting Issues: How Does Y2K Spending Map into the NIPA?

Given the remediation efforts noted above, it seems probable that firms replaced a significant amount of their stock of computers and software, and spent a considerable amount of resources to fix existing source code, in an effort to avoid disruptions at the century date change. To see how difficult estimating the direct result of Y2K-related spending in the NIPA is, consider three different scenarios by which Firm A could have undertaken its Y2K fix.

Scenario 1. In the first scenario, suppose that Firm A paid Firm B $10 million to make its

[17] See the minutes of the August 24, 1999, meeting of the Federal Open Market Committee (< www.federalreserve.gov/fomc/minutes/19990824.htm >). From the week ending December 1, 1999, to the week ending February 2, 2000, surplus vault cash jumped from $17.4 billion to $40.5 billion. As a share of total vault cash, surplus cash surged to an all-time high of just over 50 percent.

Table 3

Where Was the Investment Bust During the 2001 Recession? (Percentage Deviations from Trend)

Recession period	Business structures	IPES	Industrial equipment	Transportation equipment	Residential
1960:Q2 to 1961:Q1					
Average deviation	1.90	3.83	2.53	–4.22	–6.44
High	3.55	7.88	11.74	5.35	–2.28
Low	0.67	–3.60	–7.35	–16.14	–8.76
High – Low	2.88	11.48	19.08	21.48	6.48
1969:Q4 to 1970:Q4					
Average deviation	0.54	4.11	1.28	–12.16	–14.46
High	2.47	7.92	3.68	1.44	–8.64
Low	–1.29	–0.80	–2.58	–32.48	–22.36
High – Low	3.76	8.72	6.26	33.92	13.72
1973:Q4 to 1975:Q1					
Average deviation	3.97	7.18	8.73	–0.24	–12.82
High	7.92	9.29	13.25	12.73	5.32
Low	–3.54	3.21	–3.33	–18.53	–35.85
High – Low	11.46	6.09	16.59	31.26	41.17
1981:Q3 to 1982:Q4					
Average deviation	3.93	–3.92	–1.96	–14.43	–30.22
High	11.60	2.55	3.49	–2.99	–13.44
Low	–4.24	–15.29	–10.70	–27.08	–40.88
High – Low	15.83	17.84	14.19	24.08	27.44
1990:Q3 to 1991:Q1					
Average deviation	5.35	–0.95	–1.58	0.14	–13.33
High	8.20	0.14	1.53	2.78	–5.76
Low	3.26	–3.07	–4.03	–1.41	–20.73
High – Low	4.94	3.21	5.56	4.20	14.97
2001:Q1 to 2001:Q4					
Average deviation	–2.52	–7.22	–2.95	–10.50	–1.88
High	2.06	1.66	4.92	–7.57	–0.52
Low	–10.76	–13.68	–9.92	–13.08	–3.63
High – Low	12.82	15.34	14.84	5.50	3.11

NOTE: Percentages are calculated as deviations from trend in chain-weighted dollars. The trend value is estimated from the Hodrick-Prescott algorithm. See footnote 5. Sample period for Hodrick-Prescott calculations are 1947:Q1 to 2001:Q4 for all categories except IPES, which begins in 1959:Q1.

mainframe computer code Y2K compliant. Bureau of Economic Analysis methodology stipulates that "software-related expenditures treated as investment *exclude* maintenance and repair expenditures on existing software, including expenditures to fix so-called 'Y2K' problems." Accordingly, if Firm A reports these receipts as software maintenance and repair, then there would be no corresponding increase in software investment. However, if Firm A reports these receipts as custom programming services (custom software), then the effect is an increase in software investment.[18]

Scenario 2. The same rationale holds if, instead of contracting out the services in question, the firm decided to hire additional workers for the task (own-account software). In either case, though, the $10 million in wages and salaries paid to the employees would show up on the income side of the NIPA. Thus, whether the $10 million shows up as a final output on the product side or is treated as an intermediate expense on the product side, depends on how these receipts are reported.[19]

Scenario 3. Finally, assume instead that Firm A decided to purchase new software (prepackaged software) or new Y2K-compliant computers that included embedded software. In this case, the new equipment or software would be classified as new investment even if the equipment or software it replaced was fully depreciated. Fully ascertaining what is a final product and what is an intermediate expense is probably not possible because of data limitations. That is, U.S. statistical agencies such as the Bureau of Economic Analysis and the Bureau of the Census have not published estimates of Y2K-related spending. There are estimates, however, that have been pieced together with the help of private consultants. For example, the U.S. Department of Commerce's Economics and Statistics Administration, with the assistance of the International Data Corporation, reported that nearly half (46 percent) of worldwide Y2K spending reflected "internal" efforts to "identify and diagnose the problem, especially in the case of embedded chips."[20] This fraction is only a little more than a quarter (27 percent) of total reflected "external" spending. Expenditures on hardware (11 percent) and software (17 percent) were also a little more than a quarter of the total spending. Assuming that these percentages apply to the United States and that they accurately reflect the distribution of spending, then only about half of total Y2K expenditures probably flowed into the output of final goods and services, with the remainder slotted as intermediate expenses.[21]

Y2K Cost Estimates

In testimony before the U.S. Senate Committee on Commerce, Science, and Transportation, (then) Federal Reserve Governor Edward Kelley noted that a survey of corporate 10-K financial reports filed with the Securities and Exchange Commission by Federal Reserve Board staff economists indicated that "an educated guess of the sunk cost of Y2K remedial efforts in the U.S. private sector might be roughly $50 billion."[22] The aforementioned Economics and Statistics Administration report, citing the study commissioned by the International Data Corporation in October 1999, estimated that the cost of public- and private-sector Y2K spending in the United States from 1995 to 2001 was expected to total $114 billion.[23] In inflation-adjusted terms, as Table 4 indicates, this amounted to roughly $131 billion.

If the numbers in Table 4 are a reasonable approximation of the actual Y2K-related spending that occurred, then the efforts of U.S. firms to ready themselves for the century date change totaled a bit less than 1.5 percent of GDP over this six-year period. While fairly significant, it hardly seems to have been a major event expenditure-wise, given that it was spread out over several years. Second, if, as conjectured above, only about half of Y2K expenditures flowed into final output, then the potential Y2K-related investment contribution to real GDP

[18] In the NIPA, there are three types of software treated as a fixed investment: prepackaged, custom, and own-account. See Bureau of Economic Analysis (2000). In non-benchmark years, investment for prepackaged and custom software are extrapolated using industry receipts rather than product-type receipts. For example, the Bureau of Economic Analysis uses services receipts for a firm that classifies itself as a custom software establishment to extrapolate (using the input-output accounts) the NIPA output for custom software. The last input-output benchmark is for 1992.

[19] In the NIPA, it is assumed that intermediate expenses eventually show up in final output.

[20] See Economic and Statistical Administration (1999, pp. 3-4).

[21] A further complication is that, unlike the estimates of prepackaged and custom software investment described in footnote 18 (commodity flow method), own-account software investment is measured as the sum of production costs (wage and non-wage) and the costs of intermediate inputs. See Bureau of Economic Analysis (2000).

[22] < www.federalreserve.gov/boarddocs/testimony/1998/19980428.htm > .

[23] The Economic and Statistical Administration admitted that this estimate was not precise. Accordingly, they place a confidence interval of $50 billion around either side of their point estimate.

Table 4

Real Y2K Spending and the Change in Real Fixed Investment in Information Processing Equipment and Software

	Billions of dollars		Percent		Percentage points	
Year	Y2K	IPES	Y2K/IPES	IPES/GDP	IPES contribution to real GDP growth	Potential Y2K contribution to real GDP growth
1995	4.3	36.2	11.8	3.5	0.56	0.07
1996	15.5	44.5	34.8	3.7	0.62	0.22
1997	29.4	62.5	47.0	3.9	0.77	0.36
1998	37.7	79.5	47.4	4.1	0.85	0.40
1999	36.5	78.8	46.3	4.3	0.73	0.34
2000	6.8	75.2	9.0	4.5	0.63	0.06
2001	0.8	–34.8	–2.3	4.0	–0.26	0.01
Sum: 1995-2001	130.9	341.9	N/A	N/A	3.90	1.45

NOTE: Estimates for 1999-2001 are projections. Real Y2K spending is the current-dollar value of spending deflated by the chain-type price index for IPES. Sums subject to rounding.

SOURCE: Economics and Statistics Administration, Bureau of Economic Analysis, Haver Analytics, and the author's calculations (final column).

growth was much less, about 0.75 percentage points (half of 1.45 percent). Finally, the bulk of the Y2K-related spending occurred from 1997 to 1999 ($103.6 billion). Accordingly, the timing of the expenditures suggests that the surge in IPES investment that peaked in the fourth quarter of 2000 was probably not driven by Y2K expenditures. Thus, while the investment boom and bust was probably exacerbated by Y2K remediation efforts (and their subsequent cessation), it was more likely the result of declines in the equity cost of capital or other business cycle effects.[24] This conclusion is similar to that reached by the Bank of England, which reported that in March 2000 only "a small minority of companies were planning much lower IT investment over the next two years than in the previous two years."[25]

CONCLUSION

A salient feature of the business cycle that spanned from March 1991 to the end of 2002 (the National Bureau of Economic Research Committee has yet to identify the trough) was the high-tech investment boom and bust. Several explanations have been offered for this development, including the acceleration in labor productivity—the so-called "New Economy" story—and the stock market surge and subsequent collapse. One explanation that has not been scrutinized in detail was the spending by businesses to ready themselves for the century date change. Because many information processing systems and much of the hardware and software were not Y2K compliant as late as early 1998, it was thought that business investment in high-tech E&S would increase appreciably to fix this problem—hence, leading to a Y2K-related investment boom in the late 1990s. Although solid data are lacking, the evidence presented in this paper indicates that the investment boom and bust was more than a Y2K event.

[24] Macroeconomic Advisers (2002) found "weak evidence" of a Y2K boost to real software investment.

[25] Bakhshi and Thompson (2002).

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The Financial Condition of U.S. Banks: How Different Are Community Banks?

R. Alton Gilbert and Gregory E. Sierra

This article examines the condition of U.S. commercial banks of various sizes since the early 1990s, with an emphasis on differences between the condition of community banks and larger banks. There is evidence that deterioration in the condition of banks has adverse effects on the pace of economic activity. One reason for examining the condition of banks of different size, rather than the condition of the entire banking industry, is that community banks account for a disproportionate share of bank loans to small businesses. In addition, failures of community banks account for a disproportionate share of losses to the deposit insurance funds.

Despite the consolidation of the banking industry in recent years, community banks continue to constitute a relevant portion of the banking industry. We identify community banks as those with less than $1 billion in assets.[1] As of the fourth quarter of 2001, 85 percent of all banks had total assets less than $1 billion. While community banks accounted for about 15 percent of banking assets in the second quarter of 2001, they held about 40 percent of the number of business loans outstanding of less than $1 million.[2] Furthermore, there is evidence that the failure of community banks can have adverse effects on local economic activity.[3] The condition of community banks is especially relevant for an assessment of the risk of loss by the deposit insurance fund, since bank failure rates and Federal Deposit Insurance Corporation (FDIC) loss rates on bank failures have been inversely related to bank size (Shibut, 2001).

As the data presented in Tables 1 through 7 in this article are quickly out of date, see the web site of the Research Division of the Federal Reserve Bank of St. Louis for the most current data. In the past the condition of banks has varied substantially among regions of the United States (FDIC, 1997). Although the tables in this article are not presented by geographic region, the data appendix on the web site includes current data on the measures of bank condition in the nine U.S. Census divisions.

WHY IS THE CONDITION OF THE BANKING INDUSTRY IMPORTANT?

Before examining indicators of the condition of the banking industry, we discuss the evidence that this information may be relevant for the performance of the economy. Lown, Morgan, and Rohatgi (2000) examine how changes in the credit standards of banks have affected the growth of bank loans and the pace of economic activity. Their evidence is based on a survey of changes in the standards that relatively large banks apply in their lending decisions.[4] Lending standards include collateral requirements and the minimum credit rating and maximum leverage requirements of borrowers. Lown, Morgan, and Rohatgi (2000) present evidence that changes in the percentage of banks that report tightening their credit standards for commercial and industrial (C&I) lending affect the growth rate of bank lending and some measures of economic activity. If deterioration in the financial condition of banks induces them to tighten their lending standards, then adverse effects on the pace of economic activity could result. However, this possible result cannot be inferred for community banks because all of the banks included

[1] It is common to identify community banks in terms of the amount of their assets. For instance, the Gramm-Leach-Bliley Act of 1999 identifies community financial institutions (banks and savings and loan associations) as those with total assets of less than $500 million. *American Banker* uses a definition of a community bank that includes total assets of $1 billion; see p. 6 of the March 27, 2002, issue. In a discussion of the condition of community banks, Governor Susan Bies of the Federal Reserve Board refers to data for banks with total assets less than $1 billion (Bies, 2002).

[2] See Berger, Demsetz, and Strahan (1999) for a survey of the literature on the effects of consolidation of the banking industry, including the role of small banks in lending to small businesses.

[3] See Gilbert and Kochin (1989). For a study that draws the opposite conclusion from data for Texas, see Clair, O'Driscoll, and Yeats (1994).

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[4] The sample of banks for the Senior Loan Officers Opinion Survey on Bank Lending Practices is selected from among the largest banks in each Federal Reserve District. As of 2001, large banks are identified as those with total domestic assets of $20 billion or more.

in that terms of lending survey are substantially larger than community banks.

The period of the 1980s and early 1990s is especially important for an analysis of the effects of bank condition on the performance of the economy. Several hundred banks failed during these years, and many of the banks were subject to close supervision during at least part of this period. Supervisors usually require banks with substantial loan problems to increase their capital ratios, and these banks often attempt to increase their capital ratios by reducing their assets (Peek and Rosengren, 1995b and 1996; Curry et al., 1999).

Several studies report evidence of a credit crunch in the 1980s and early 1990s. In a credit crunch, large numbers of banks simultaneously restrict their lending. An increase in problem loans may induce banks to restrict their lending. Some bank customers who are denied credit do not have access to credit from alternative sources on terms similar to those provided to them in the past. In a credit crunch, the decline in the supply of bank loans is large enough to reduce the pace of economic activity. Studies in the credit crunch literature draw different conclusions about the magnitude of the effect of the credit crunch on the pace of economic activity (Berger and Udell, 1994; Bernanke and Lown, 1991; Hancock, Laing, and Wilcox, 1995; and Peek and Rosengren, 1995a).

How relevant the evidence from the credit crunch period is for other periods depends on what caused banks to reduce the supply of credit. If banks reduced lending because of the deterioration in their condition, we may conclude that a similar deterioration in their condition in the future would induce a similar restriction on bank lending. One of the charges by bankers during that period, however, was that bank supervisors had tightened standards for judging a bank to be in satisfactory condition, forcing many banks to reduce their lending. If that charge is correct, the evidence of the credit crunch period would not be relevant for considering how a deterioration in the condition of banks would affect the supply of loans. Berger et al. (2001) recently reexamined the credit crunch episode to determine whether there was evidence of a tightening of supervisory standards. They find evidence that the toughness of supervisory standards for satisfactory banking condition increased during the credit crunch period (1989-92) and declined during the following boom period in bank lending (1993-98). They conclude, however, that these changes in supervisory standards had only small effects on bank lending. The implication of Berger et al. (2001) is that the reduction in the supply of bank credit during the credit crunch period reflected primarily the deterioration in the condition of banks rather than a tightening of supervisory standards.

The studies cited in this section do not attempt to isolate the effects of the condition of community banks on the pace of economic activity. Although several of the studies of the credit crunch include data for small banks (Bernanke and Lown, 1991; Berger and Udell, 1994; and Berger, Kyle, and Scalise, 2001), the authors do not attempt to attribute the effects on real economic activity to restrictions in the supply of credit by small banks. An argument that deterioration in the condition of community banks has adverse effects on real economic activity must be based on the role of community banks in lending to small businesses, which tend to have fewer borrowing options than larger businesses, and the possible adverse effects of individual bank failures on economic activity in the communities where the failed banks had offices.

TRENDS IN THE CONDITION OF BANKS

Table 1 presents the number of banks in each size group in each period. The largest changes over time involve the banks in the smallest and largest size groups. Since 1991 there has been a large reduction in the number of banks with total assets less than $300 million, and the number of banks in the largest group (total assets in excess of $20 billion) more than doubled. These changes reflect consolidation of the banking industry and internal growth of banks, which, in many cases, moved banks into the larger size groups.

Tables 2 through 7 present trends in the condition of banks in various size groups since 1991. Each bank is assigned to one of the five size groups each quarter based on its total assets that quarter. The five size groups are not indexed over time for inflation; the minimum and maximum asset size for the banks in each group in these tables remain fixed over time. One reason for using size groups fixed in nominal dollars is that the banks with assets below $300 million are subject to different reporting requirements than larger banks.

Nonperforming Loans

Table 2 presents our first measure of problem loans: the percentage of total loans that are non-

Table 1

Number of Banks by Asset Class and Date

	Total assets of banks (millions of dollars)				
Period	Up to $300	$300 to $1,000	$1,000 to $10,000	$10,000 to $20,000	Over $20,000
1991	10,980	631	321	29	18
1992	10,525	635	324	30	19
1993	10,055	630	320	31	23
1994	9,558	637	326	31	26
1995	8,988	644	334	41	28
1996	8,536	658	331	41	31
1997	8,171	675	306	30	37
1998	7,797	692	309	24	41
1999:Q1	7,604	675	313	28	44
1999:Q2	7,549	684	311	29	47
1999:Q3	7,480	702	308	30	46
1999:Q4	7,401	737	309	29	46
2000:Q1	7,361	728	292	33	44
2000:Q2	7,309	736	291	36	44
2000:Q3	7,203	736	295	37	43
2000:Q4	7,118	748	307	35	45
2001:Q1	7,022	771	305	34	44
2001:Q2	6,947	786	306	30	47
2001:Q3	6,889	811	312	34	44
2001:Q4	6,798	835	312	31	47

NOTE: The number of banks in each size class by date includes all banks with total assets (call report item rcfd2170) greater than zero. For annual observations, the number of banks equals the average number of the prior four quarters. Size class is determined on a quarterly basis.

performing. Nonperforming loans are those loans that bank managers report as past due 90 days or more or classify as nonaccrual. Banks stop accruing interest due on loans as current income when they classify the loans as nonaccrual.

Nonperforming loan ratios of community banks (the first two columns of Table 2) increased modestly during 2001. In contrast, the nonperforming loan ratios of banks with total assets in excess of $10 billion began rising during the late 1990s and during 2001 rose substantially above the average nonperforming loan ratios of community banks. For banks in each size group, however, nonperforming loan ratios in recent quarters remain far below the nonperforming loan ratios for banks of comparable size during 1991, the last year of the 1990-91 recession.

Charge-Off of Loan Losses

The trend and level of loan charge-offs can also help in the assessment of asset quality. A high level of charge-offs, per se, does not indicate a weak portfolio because the charged-off assets are no longer on the books. However, recent charge-offs can be informative about the assets that remain on the books because the remaining assets may have been originated under similar circumstances or at about the same time. Table 3 presents the net charge-off rate for total loans.

In interpreting the patterns in Table 3, it is important to recognize seasonal patterns in charge-off rates. Among the banks in each group with total assets less than $10 billion, charge-off rates rose from the third quarter to the fourth quarter in each

Table 2

Percentage of Total Loans That Are Nonperforming

	Total assets of banks (millions of dollars)				
Period	Up to $300	$300 to $1,000	$1,000 to $10,000	$10,000 to $20,000	Over $20,000
1991	2.03	2.42	3.27	3.92	5.67
1992	1.63	1.92	2.55	3.13	4.80
1993	1.35	1.54	1.79	1.76	2.70
1994	1.07	1.05	1.12	1.32	1.61
1995	1.03	0.99	1.06	1.12	1.35
1996	1.00	0.96	1.14	1.00	1.01
1997	0.92	0.84	1.07	1.12	0.91
1998	0.94	0.80	1.03	1.10	0.94
1999:Q1	0.98	0.82	0.99	1.19	0.98
1999:Q2	0.95	0.75	0.88	1.28	0.93
1999:Q3	0.93	0.78	0.87	1.31	0.99
1999:Q4	0.82	0.72	0.82	1.16	1.00
2000:Q1	0.87	0.73	0.85	1.14	1.01
2000:Q2	0.86	0.71	0.82	1.17	1.05
2000:Q3	0.86	0.77	0.85	1.22	1.09
2000:Q4	0.85	0.77	0.90	1.31	1.24
2001:Q1	0.92	0.82	1.00	1.31	1.32
2001:Q2	0.98	0.86	1.02	1.28	1.40
2001:Q3	1.03	0.92	1.09	1.43	1.48
2001:Q4	1.01	0.91	1.03	1.35	1.62

NOTE: Percentage of nonperforming loans equals total nonperforming loans divided by total loans. Nonperforming loans are those loans that bank managers classify as 90 days or more past due or nonaccrual in the call report. Precisely, total nonperforming loans equals the sum of call report items rcfd1403 and rcfd1407. Total loans equals call report item number rcfd2122. When an annual number alone is given, it is the mean of quarterly numbers. Bank size group is determined on a quarterly basis.

of the years 1999 through 2001. For the banks in these size categories, therefore, it is more appropriate to compare the charge-off rates in the fourth quarter of 2001 with the rates in the fourth quarter of 2000 rather than compare them with the charge-off rates in the third quarter of 2001.

Net charge-off rates rose slightly among community banks during 2001. The net charge-off rates among banks with total assets above $1 billion, in contrast, began to rise during the 1990s and have risen during recent quarters to levels substantially above those for community banks. Charge-off rates among banks in each size group remain below 1991 levels. Although the weakness in the economy has been accompanied by increasing net charge-offs and asset quality recently has fallen only slightly, the recent upward trend in charge-offs has not yet reversed.

One challenge in interpreting changes in net charge-off rates over time is that these changes may reflect to some extent changes over time in supervisory standards. Supervisors have the authority to influence the magnitude and timing of charge-offs of loan losses by banks. Berger et al. (2001) find some evidence of changes in supervisory standards over time, but these changes in standards had only a small effect on bank lending.

Problem Commercial and Industrial Loans

Losses on C&I loans are often important causes of serious financial problems in banks. Tables 4 and

Table 3

Percentage of Total Loans Charged Off as Losses

	Total assets of banks (millions of dollars)				
Period	Up to $300	$300 to $1,000	$1,000 to $10,000	$10,000 to $20,000	Over $20,000
1991	1.14	1.52	2.04	1.93	2.28
1992	0.83	1.18	1.57	1.50	1.65
1993	0.54	0.72	0.93	1.01	1.09
1994	0.41	0.47	0.62	0.79	0.45
1995	0.42	0.53	0.91	0.82	0.39
1996	0.43	0.63	1.00	0.95	0.35
1997	0.41	0.50	1.22	1.27	0.52
1998	0.46	0.60	1.13	1.01	0.63
1999:Q1	0.22	0.38	0.83	0.96	0.57
1999:Q2	0.27	0.33	0.72	1.01	0.51
1999:Q3	0.28	0.33	0.68	1.16	0.57
1999:Q4	0.42	0.52	0.78	1.07	0.68
2000:Q1	0.19	0.39	0.64	0.98	0.54
2000:Q2	0.31	0.32	0.52	1.09	0.54
2000:Q3	0.29	0.36	0.61	1.17	0.57
2000:Q4	0.41	0.46	0.79	1.48	0.97
2001:Q1	0.20	0.30	0.67	1.44	0.73
2001:Q2	0.28	0.40	0.87	1.26	0.84
2001:Q3	0.34	0.39	0.89	1.52	1.09
2001:Q4	0.52	0.56	1.40	1.42	1.49

NOTE: Charge-offs are measured on a net basis—loans charged off as losses minus recoveries on loans previously charged off. The percentage of loans charged off as losses each quarter (net of recoveries on loans previously charged off as losses) is calculated by summing net charge-off for all banks in the size group and dividing by the sum of their total loans. Quarterly percentages are multiplied by four to raise them to annual rates.

5 present average nonperforming loan ratios and net charge-off rates for C&I loans. Nonperforming C&I loan ratios declined substantially during the economic recovery after the 1990-91 recession through 1997 for banks in each size group (Table 4). Trends in the nonperforming C&I loan ratios of community banks and larger banks diverged after 1997, rising among banks with total assets above $1 billion but not among community banks. Nonperforming C&I loan ratios rose slightly during 2001 among banks with assets between $300 million and $1 billion, but continued to decline among banks in the smallest size group. During 2001, nonperforming C&I loan ratios were lower among community banks than among larger banks.

The quarterly pattern of net charge-off rates on C&I loans (Table 5) indicates the tendency for the banks in each size group to concentrate their charge-offs in the fourth quarter of the year. Although charge-off rates on C&I loans rose in recent quarters among community banks, their charge-off rates are substantially lower than those for larger banks.

Coverage and Equity Ratios

The financial health of banks depends not only on the magnitude of their problem loans (Tables 2 through 5), but also on the capacity of the banks to absorb loan losses (Tables 6 and 7). Interpretation of the patterns in Tables 6 and 7 requires information about bank accounting practices for nonperforming loans and for loan losses. When a bank

Table 4

Percentage of Commercial Loans That Are Nonperforming

	Total assets of banks (millions of dollars)				
Period	Up to $300	$300 to $1,000	$1,000 to $10,000	$10,000 to $20,000	Over $20,000
1991	4.17	3.18	3.74	4.34	5.34
1992	3.61	2.53	2.77	3.58	3.87
1993	2.83	1.89	1.74	1.79	2.10
1994	2.24	1.20	0.98	1.19	1.23
1995	2.07	1.10	0.98	0.98	1.19
1996	2.07	1.24	0.90	0.72	0.86
1997	1.95	1.12	0.83	0.61	0.73
1998	2.06	1.15	0.90	0.83	0.89
1999:Q1	2.27	1.16	1.01	0.97	1.00
1999:Q2	2.19	1.06	1.00	1.28	0.99
1999:Q3	2.13	1.20	1.07	1.14	1.15
1999:Q4	1.79	1.05	0.91	1.18	1.17
2000:Q1	1.92	1.09	1.04	1.21	1.27
2000:Q2	1.90	1.13	1.15	1.30	1.43
2000:Q3	1.91	1.22	1.23	1.35	1.57
2000:Q4	1.78	1.18	1.33	1.56	1.74
2001:Q1	1.40	1.31	1.53	1.64	1.95
2001:Q2	1.47	1.32	1.58	1.65	2.24
2001:Q3	1.54	1.40	1.72	1.90	2.39
2001:Q4	1.46	1.27	1.62	2.02	2.73

NOTE: Percentage of nonperforming commercial loans equals total nonperforming commercial loans divided by total commercial loans. Nonperforming commercial loans are those commercial loans that bank managers classify as 90 days or more past due or nonaccrual in the call report. Precisely, nonperforming commercial loans equals the sum of call report items rcfd1252, rcfd1253, rcfd1255, rcfd1256, rcon1223, rcon1224, rcon1607, and rcon1608. Total commercial loans equals call report item number rcfd1766. When an annual number alone is given, it is the mean of the quarterly numbers. Bank size group is determined on a quarterly basis.

charges off a loan as a loss, it reduces its loans and reduces an account called the "allowance for loan and lease losses" by the amount of the loan that was charged off as a loss. The bank increases the dollar amount of its allowance for loan and lease losses by incurring an expense called "provision for loan and lease losses." In other words, the allowance for loan and lease losses represents the accumulation of all provisions for loan and lease losses less all charge-offs to the account. Since provisions are expenses, increases in provisions reduce net income. As with any expense, provisions for loan and lease losses reduce a bank's equity.

Under the principles of bank accounting, loans reported as nonperforming have not yet been charged off as losses. When a bank charges a nonperforming loan off as a loss, it no longer reports the loan as nonperforming. An increase in nonperforming loans increases the chances that a bank will have larger charges against its allowance for loan and lease losses in the future. Banks often increase their allowances for loan and lease losses through larger provisions when they anticipate future losses on nonperforming loans.

A measure of the adequacy of a bank's allowance to absorb future loan losses is the ratio of the allowance to the amount of nonperforming loans, commonly called the "coverage ratio." An allowance greater than nonperforming loans suggests that even if all of a bank's nonperforming loans were charged

Table 5

Percentage of Commercial Loans Charged Off as Losses

	Total assets of banks (millions of dollars)				
Period	Up to $300	$300 to $1,000	$1,000 to $10,000	$10,000 to $20,000	Over $20,000
1991	3.13	2.53	2.59	1.97	2.57
1992	2.29	1.97	1.37	1.23	1.17
1993	1.52	0.86	0.90	0.77	0.53
1994	1.16	0.47	0.33	0.26	0.16
1995	1.14	0.70	0.22	0.36	0.26
1996	1.07	0.70	0.40	0.17	0.10
1997	1.05	0.64	0.26	0.41	0.29
1998	1.24	0.75	0.64	0.47	0.56
1999:Q1	0.46	0.31	0.30	0.39	0.46
1999:Q2	0.77	0.23	0.40	0.41	0.55
1999:Q3	0.62	0.36	0.68	0.47	0.60
1999:Q4	1.16	0.79	0.90	0.73	0.72
2000:Q1	0.30	0.31	0.41	0.40	0.55
2000:Q2	0.65	0.46	0.47	0.60	0.69
2000:Q3	0.63	0.44	0.83	0.62	0.69
2000:Q4	1.12	0.88	1.08	1.12	1.33
2001:Q1	0.35	0.36	0.60	0.95	0.99
2001:Q2	0.58	0.69	1.07	0.82	1.29
2001:Q3	0.66	0.81	1.06	1.00	1.59
2001:Q4	1.23	1.10	2.90	1.45	2.69

NOTE: Charge-offs are measured on a net basis—loans charged off as losses minus recoveries on loans previously charged off. The percentage of loans charged off as losses each quarter (net of recoveries on loans previously charged off as losses) is calculated by summing net commercial loan charge-offs for all banks in the size group and dividing by the sum of their total commercial loans. Quarterly percentages are multiplied by four to raise them to annual rates.

Because of changes in the call report in 2001, the charge-off rate on commercial and industrial loans for banks with total assets below $300 million for 2001 are not exactly comparable to those for previous years. Prior to 2001:Q1, the ratio displayed equals the charge-off rate for commercial and industrial loans and "other loans." The numbers in the column "Up to $300" should be comparable before and after 2001:Q1, however, because in no time period did "other loans" of banks under $300 million exceed 3 percent of the sum of commercial and industrial and "other loans." The charge-off rate in 2001 is comparable for banks across size classes.

off as losses, its allowance would be adequate to absorb the charge-offs. In addition, banks with coverage ratios above unity are less likely to need relatively large provisions for loan and lease losses in the future, to offset losses charged against their allowance, than banks with coverage ratios below unity.

Table 6 shows the percentage of assets among banks with coverage ratios of unity or higher. An increase in this percentage bolsters the protection of bank equity from charge-offs of nonperforming loans. These percentages were relatively low in 1991 but increased rapidly in the following years. During recent quarters, this percentage has declined for banks in each size group, with the largest declines among banks with assets in excess of $20 billion. As recently as the third quarter of 2000, almost all of the assets among these large banks were held by banks with coverage ratios in excess of unity. The average percentage for 2001, in contrast, was just above 80 percent.

The coverage ratios for loan losses (shown in Table 6) have also declined during recent quarters among community banks, and this measure is lower for community banks than for larger banks. This

Table 6

Percentage of Assets at Banks Whose Allowance for Loans and Lease Losses Exceeds Their Nonperforming Loans

	Total assets of banks (millions of dollars)				
Period	Up to $300	$300 to $1,000	$1,000 to $10,000	$10,000 to $20,000	Over $20,000
1991	55.05	49.74	42.46	31.53	19.48
1992	66.57	64.02	66.07	55.85	34.39
1993	72.34	76.40	81.65	84.33	53.15
1994	77.86	86.16	93.04	91.41	97.80
1995	77.65	84.02	87.53	95.45	94.35
1996	75.87	81.90	89.21	92.10	98.86
1997	77.34	86.04	89.87	87.36	100.00
1998	76.62	86.34	88.40	85.49	97.71
1999:Q1	76.03	86.29	89.55	87.80	97.54
1999:Q2	76.51	86.41	90.59	91.00	98.19
1999:Q3	76.88	86.68	90.35	91.45	97.63
1999:Q4	78.83	88.56	90.50	93.78	96.93
2000:Q1	77.43	86.34	90.62	90.77	98.68
2000:Q2	77.74	87.25	88.19	93.88	98.76
2000:Q3	77.48	84.45	87.28	89.46	98.91
2000:Q4	78.32	84.42	84.16	92.66	92.14
2001:Q1	74.38	82.91	85.14	92.50	83.23
2001:Q2	73.29	81.53	85.15	88.05	79.30
2001:Q3	70.77	78.75	80.83	83.14	76.78
2001:Q4	71.68	78.89	82.83	89.05	82.18

NOTE: Each bank is classified by whether the ratio of its allowance for loan and lease losses to nonperforming loans is greater than one. The allowance for loan and lease losses is the sum of call report items rcfd3123 and rcfd3128. Total nonperforming loans equals the sum of call report items rcfd1403 and rcfd1407. For each size category, the sum of total assets held by banks where this ratio is greater than one is divided by the sum of total assets held by banks in the class.

contrast implies that if the loss rate on nonperforming loans were the same on average among the banks in each size group, then the allowances for loan losses would tend to be less adequate to absorb losses (i.e., to avoid reductions in equity) among community banks than among larger banks.

The capacity of banks to absorb losses also depends on the amount of equity those banks hold. Table 7 indicates that banks in each size group have maintained relatively high ratios of equity to total assets during recent quarters. As of the end of 2001, the equity ratios for banks in each size group were at or near their highest levels since 1991. The banking system has substantial equity available to absorb losses that banks may incur because of large and unexpected decreases in asset quality.

Assessment of Patterns in Bank Accounting Information

Overall, the accounting numbers in Tables 2 through 5 indicate that loan quality has diminished during recent quarters, more so for larger banks than for community banks. Community banks have maintained lower nonperforming loan and charge-off ratios than larger banks, although they have slightly smaller buffers to absorb loan losses than do larger banks. Yet, the percentage of assets at community banks with coverage ratios greater than unity is still

Table 7

Total Equity as a Percentage of Total Assets

	Total assets of banks (millions of dollars)				
Period	Up to $300	$300 to $1,000	$1,000 to $10,000	$10,000 to $20,000	Over $20,000
1991	8.88	7.78	7.29	6.27	5.24
1992	9.22	8.31	8.13	7.41	6.66
1993	9.72	8.88	8.74	8.00	7.37
1994	9.66	9.08	8.55	8.49	6.91
1995	10.60	9.62	9.22	8.53	7.16
1996	10.57	9.81	9.44	8.30	8.10
1997	10.85	10.25	9.95	9.33	8.35
1998	10.89	9.97	10.59	10.23	8.27
1999:Q1	10.36	9.41	9.83	8.87	7.93
1999:Q2	10.32	9.39	9.76	8.32	7.97
1999:Q3	10.39	9.62	9.67	8.74	8.44
1999:Q4	10.30	9.65	9.79	8.48	8.76
2000:Q1	10.04	9.37	9.16	8.58	8.03
2000:Q2	10.28	9.43	8.94	9.32	8.10
2000:Q3	10.57	9.67	9.42	9.50	8.41
2000:Q4	10.86	10.04	9.62	9.58	8.44
2001:Q1	10.55	9.85	9.38	9.45	8.25
2001:Q2	10.68	9.94	9.65	10.18	8.27
2001:Q3	10.94	10.19	9.99	10.64	8.87
2001:Q4	10.82	10.21	10.30	11.13	9.32

NOTE: For banks in each size category, the sum of equity is divided by the sum of total assets. Equity equals call report item rcfd3210, and total assets is derived from call report item rcfd3368.

high relative to the early 1990s, indicating that community banks have more adequate buffers of allowances for loan losses now than during that time. Banks in each of the five size groups, on average, currently have high ratios of equity to total assets relative to those in the early 1990s—large enough to absorb substantial losses. In sum, the analysis based on Tables 2 through 7 suggests that bank condition has weakened recently but is still good. Whether the trend of diminishing loan quality continues to undermine the condition of banks hinges in part upon the performance of the U.S. economy.

SIMULATION OF AN EARLY WARNING MODEL

Each of the financial ratios in Tables 2 through 7 provides limited information about the condition of banks, and some of the ratios provide conflicting signals. For instance, Table 2 shows rising nonperforming loan ratios, whereas Table 7 shows rising ratios of equity to total assets. Early warning models provide a means of condensing several measures of bank condition into an index number that weights financial ratios by how much each measure contributes to the prediction of a bank's financial distress. We use the output from the SEER risk-rank model as a means of condensing several measures of bank condition into one signal.

The Federal Reserve uses a system for bank surveillance called the System for Estimating Examination Ratings (SEER). One of the models used in this surveillance system is called the SEER risk-rank model. The SEER risk-rank model estimates the probability, ranging from 0 to 100 percent, that

Table 8

What Are the SEER Failure-Prediction Variables?

This table lists the independent variables used in the SEER (System to Estimate Examination Ratings) risk-rank model. The signs indicate the hypothesized relationship between each variable and the likelihood of failure in the next two years. For example, the negative sign for the net-income (ROA) ratio indicates that an increase in earnings reduces the likelihood of failure, all other things equal. We use the median of failure probabilities estimated by the SEER risk-rank model as an index of the overall health of community banks and large banks.

	Variable	Effect on failure probability
Credit risk	Loans past due 30-90 days/total assets	+
	Loans past due 90+ days/total assets	+
	Nonaccrual loans/total assets	+
	Other real estate owned (OREO)/total assets	+
	Residential real estate loans/total assets	–
	Commercial and industrial loans/total assets	+
Leverage risk	Tangible capital/total assets	–
	Net income/average assets (ROA)	–
Liquidity risk	Investment securities/total assets	–
	Large time deposits/total assets	+
Control variable	Natural log of total assets	–

NOTE: + indicates that higher levels of the variable lead to higher probabilities of failure; – indicates the opposite. Table adapted from Cole, Cornyn, and Gunther (1995).

a bank will fail within the next two years. The model uses data from banks that failed during the period from 1985 to 1991 to provide a statistical relationship between bank failures and financial data. This relationship is used to estimate a quarterly SEER risk rank for each bank using current data from the call report.[5] The independent variables of the SEER risk-rank model (which are described in Table 8) capture credit risk, leverage risk, liquidity risk, and size. Although the model's parameters are derived from data during the 1985 to 1991 period, the model is validated annually and has been shown to perform about as well as other surveillance models whose parameters are reestimated each period (Gilbert, Meyer, and Vaughan, 2002). For more details on the SEER risk-rank model, see Cole, Cornyn, and Gunther (1995). One can use early warning models to derive measures of the performance of the banking industry, as we do here (Gilbert, Meyer, and Vaughan, 2001). Since community banks have had different risk profiles and higher failure rates in the past than larger banks, we look at each group's median SEER risk rank separately.

Figure 1 plots the median failure probability for two groups of banks: community banks (assets less than $1billion) and large banks (assets greater than or equal to $1 billion). The median failure probability declined in the 1990s for both community banks and large banks. During more recent years, the median SEER risk rank of community banks has risen but stands only about 4 basis points higher than that of larger banks. The median SEER risk-rank level of both groups is still far below the level during the 1990-91 recession.

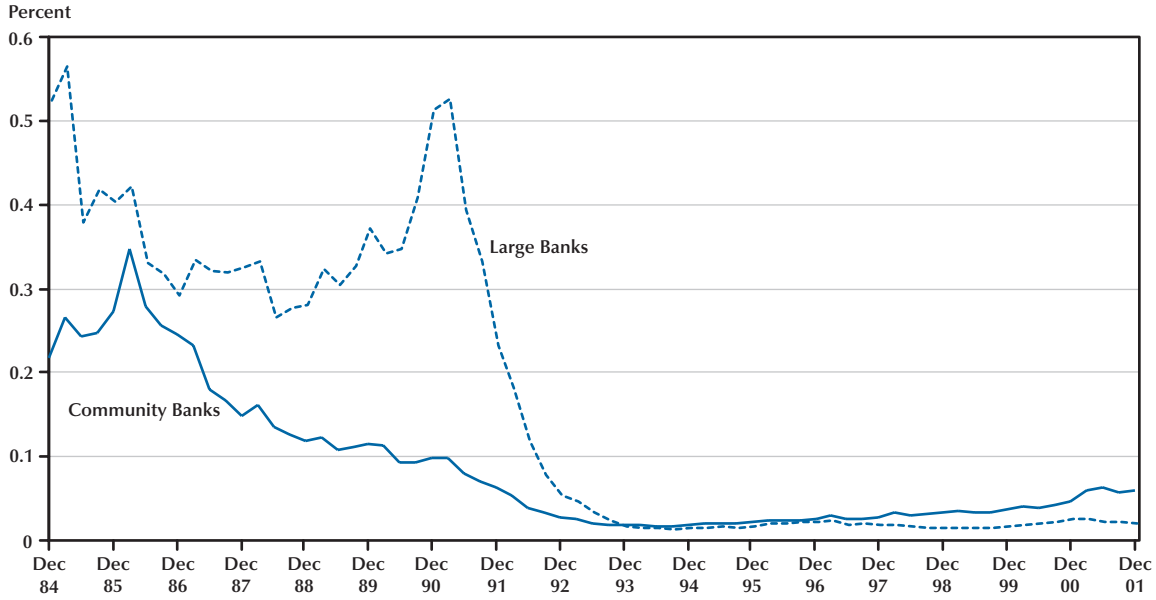
REACTIONS OF SUPERVISORS TO LOAN QUALITY PROBLEMS

If the dollar amount of problem loans rises high enough to threaten substantial losses relative to a

[5] The reader can find this description of the SEER risk-rank model and how it's used as a regulatory monitoring tool in the *Federal Reserve Commercial Bank Examination Manual*.

Figure 1

Median SEER Risk Rank of U.S. Commerical Banks



NOTE: Community banks are banks with less than $1 billion in total assets, and large banks are banks with assets greater than or equal to $1 billion. Data are quarterly.

bank's loan loss reserves and equity, the supervisor of the bank may downgrade its rating and impose an enforcement action on the bank. Most enforcement actions are agreements between banks in unsatisfactory condition and their supervisors about the actions that are necessary to restore the banks to satisfactory condition.[6]

Supervisors identify the banks that warrant enforcement actions through regularly scheduled on-site examinations. The Federal Deposit Insurance Corporation Improvement Act of 1991 requires supervisors to examine each bank every 12 to 18 months. Supervisors assess six components of bank condition during these on-site examinations—capital protection (C), asset quality (A), management competence (M), earnings strength (E), liquidity risk (L), and sensitivity to market risk (S)—awarding a grade of 1 (best) through 5 (worst) to each component. Examiners then use these six scores to award a composite CAMELS rating, also expressed on a 1 through 5 scale. Table 9 interprets each of the five composite CAMELS ratings. Supervisors give CAMELS composite scores of 1 or 2 to the banks they consider to be in satisfactory condition, and they give CAMELS composite scores of 3, 4, or 5 to unsatisfactory banks. Supervisors monitor the unsatisfactory banks closely and discipline them through enforcement actions. Banks tend to respond to a CAMELS ratings downgrade to unsatisfactory status and enforcement actions by reducing the growth rates of their assets and loans (Peek and Rosengren, 1995a,b and 1996; and Curry et al., 1999).

The CAMELS rating of a bank at a given point in time reflects the results of an examination conducted sometime during the prior 18 months. Figure 2 indicates the extent to which examiners identified problems during exams conducted each quarter since 1991. For the line labeled "Community Banks," the denominator is the number of community banks that entered the quarter rated as CAMELS 1 or 2 and were subject to examinations begun during the quarter. The numerator is the number of these banks that were rated as CAMELS 3, 4, or 5 on the exams begun during the quarter. This line indicates the rate at which the community banks initially rated as being in satisfactory condition were downgraded

[6] Some enforcement actions are cease and desist orders of courts that require bank management to cease actions that threaten the solvency of the banks. See Gilbert and Vaughan (1998) for information about enforcement actions.

Table 9

What Are CAMELS Composite Ratings?

"CAMELS" is an acronym for six components of bank condition—capital protection (C), asset quality (A), management competence (M), earnings strength (E), liquidity risk (L), and sensitivity to market risk (S). Supervisors assign a grade of 1 (best) through 5 (worst) to each component. They use these six component scores to award a CAMELS composite rating, also expressed on a 1 through 5 scale. The following is a brief description of the individual CAMELS composite ratings. Supervisors view a bank with a rating of 1 or 2 as being in satisfactory condition. When it is downgraded to a 3 or worse, it is considered an unsatisfactory bank.

	CAMELS composite rating	Description
Satisfactory	1	Financial institutions with a composite 1 rating are sound in every respect and generally have individual component ratings of 1 or 2.
	2	Financial institutions with a composite 2 rating are fundamentally sound. In general, a 2-rated institution will have no individual component ratings weaker than 3.
Unsatisfactory	3	Financial institutions with a composite 3 rating exhibit some degree of supervisory concern in one or more of the component areas.
	4	Financial institutions with a composite 4 rating generally exhibit unsafe and unsound practices or conditions. They have serious financial or managerial deficiencies that result in unsatisfactory performance.
	5	Financial institutions with a composite 5 rating generally exhibit extremely unsafe and unsound practices or conditions. Institutions in this group pose a significant risk to the deposit insurance fund, and their failure is highly probable.

SOURCE: *Federal Reserve Commercial Bank Examination Manual*.

to unsatisfactory status during each quarter. The line labeled "Large Banks" is calculated for comparable changes in CAMELS ratings for the large banks examined each quarter. The quarterly downgrade rate for community banks was about 9 percent in 1991 and fell below 2 percent in the mid-1990s. Downgrade rates for both community banks and large banks rose temporarily to about 4 percent during some quarters of 1998 through 2000. While the downgrade rates for both groups of banks have been higher in recent quarters than during the mid-1990s, the current downgrade rates for both groups of banks remain low relative to the rates of the early 1990s.

ACCESS TO CURRENT DATA

The data in this article are updated quarterly. To provide an on-going picture of the condition of community banks, the Federal Reserve Bank of St. Louis will maintain on its web page the most current data in each table in the data appendix to this article. In addition, the web page will provide the data in Tables 2 through 7 for the banks in each of the nine census divisions with total assets below $10 billion. In the past the deterioration in the condition of banks was concentrated in a few states, and this tendency for an uneven geographic concentration of distress among banks is likely to prevail in the future.[7]

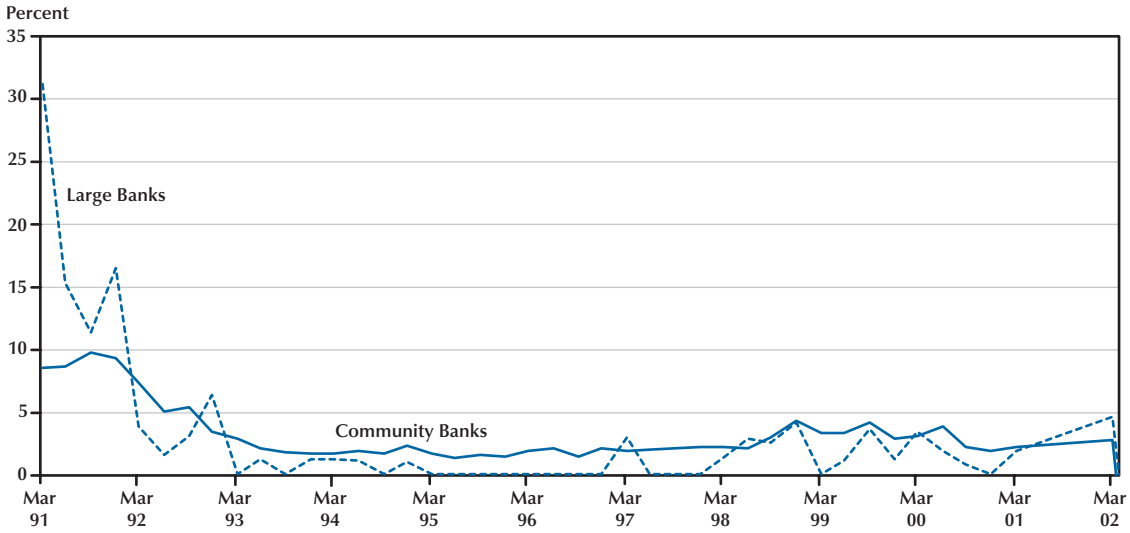
CONCLUSIONS

The condition of most community banks, identified as banks with total assets below $1 billion, has remained sound through the recent recession. There is some evidence, however, of a rise in problem loans among community banks as a group during recent quarters. For instance, the percentage of total loans that were nonperforming began to rise at community banks during 2001. In con-

[7] See FDIC (1997) for information on the geographic distribution of bank failures during the 1980s and early 1990s.

Figure 2

Percentage of Banks with CAMELS Downgrades from 1 or 2 to 3, 4, or 5



NOTE: Community banks are banks with less than $1 billion in total assets, and large banks are banks with assets greater than or equal to $1 billion. Data are quarterly.

trast, the nonperforming loan ratio for banks with assets above $1 billion began rising after 1997. The condition of banks in each size group, however, remains much stronger than during the recession that ended in 1991. The rate of downgrades (see Figure 2) suggests that examiners are not detecting a systematic deterioration in the condition of community banks.

Several studies conclude that a deterioration in the condition of banks can have adverse effects on economic activity, and some of this evidence is relevant for community banks. These studies of the "credit crunch" focus on the late 1980s and early 1990s, however, and the present condition of the banking industry in the United States remains much stronger than it was during that time. The current relatively strong condition of U.S. commercial banks (both community banks and larger banks) suggests, therefore, that the state of the banking industry is not a hindrance to U.S. economic activity.

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